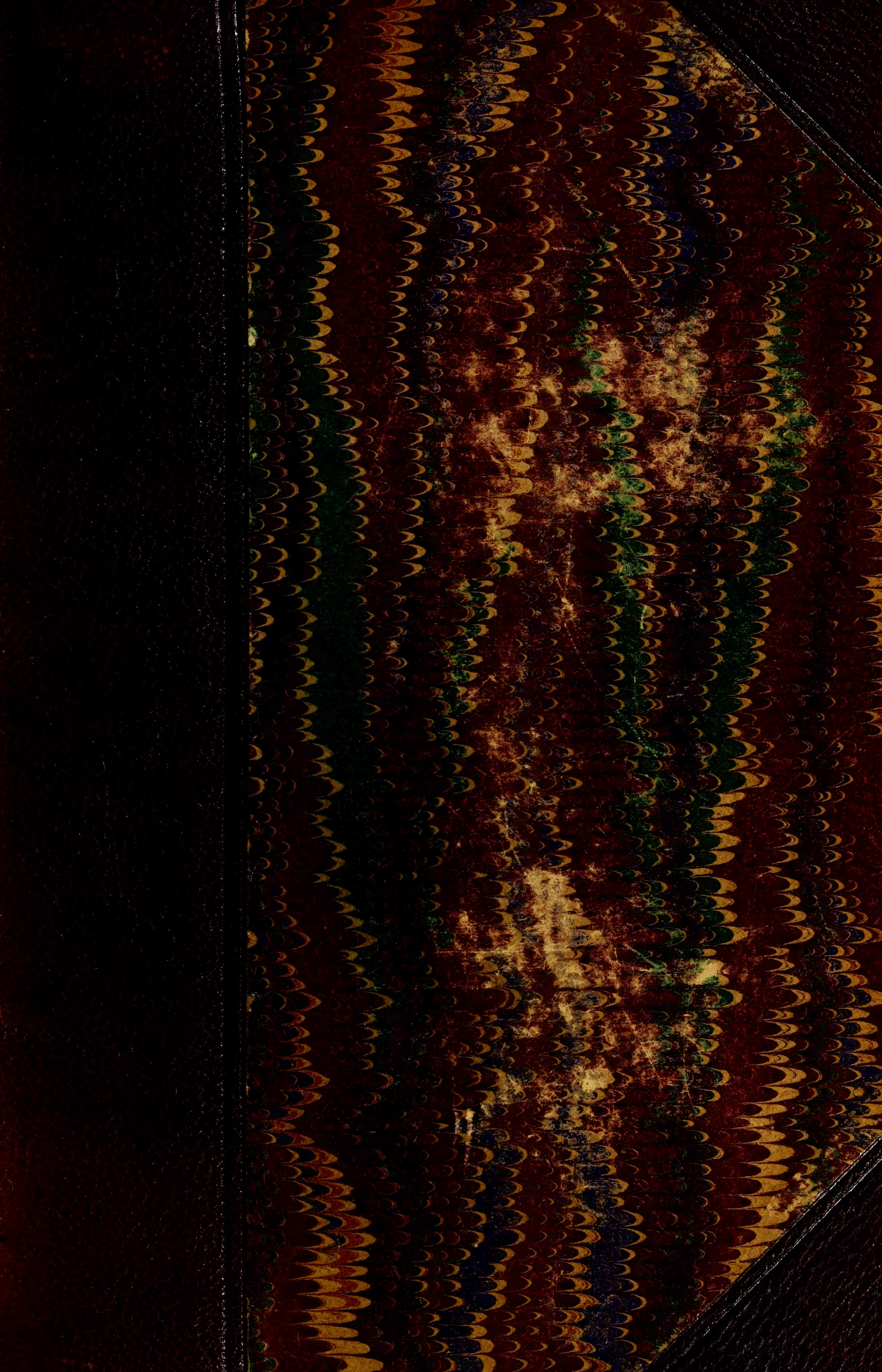


A 2/7/80

27 5

THE

FERN BULLETIN

A Quarterly Devoted to Ferns

EDITED BY WILLARD N. CLUTE

VOLUME XX.

JOLIET, ILL.
WILLARD N. CLUTE & CO.
1912

CONTENTS

PAGE.
Botrychium ramosum, Further notes on Variation in, *Raynal Dodge* 48
Christmas Fern, Another Form of the, *Willard N. Clute* 24
Christmas Fern, Still Another, *Willard N. Clute* 49
Cliff Brakes, The Rock Relations of, *E. J. Hill*.. 1
Complete Sets, Owners of 89
Illinois, The Fern Flora of, *E. J. Hill*........33, 73
Indiana, Additions to the Fern Flora of, *E. J. Hill* 25
Fern A Problematical, *Willard N. Clute* 43
Fern, Christmas, Still Another, *Willard N. Clute*.. 49
Fern Flora of Illinois, *E. J. Hill* 33, 73
Fern Flora of Michigan, *C. K. Dodge* 6
Fern Names, Priority and, *Willard N. Clute* 68
Ferns, Notes on Various, *S. Fred Prince* 52
Fernworts, Rare Forms of, ... 24, 49, 74
Michigan, Fern Flora of, *C. K. Dolge* 6
Nephrodium deltoideum, *Willard N. Clute* 20
Ophioglossum Vulgatum in Nebraska, *James M. Bates* 67
Osmundas, The, *Adella Prescott* 21
Polypodium or Xiphiopteris, *Willard N. Clute*.... 65
Priority and Fern Names, *Willard N. Clute* 68
Rare Forms of Fernworts 24, 49, 74
Schizaea pusilla at Home, *C. F. Saunders* 54
Spleenworts, The Tall, *Adella Prescott* 46
Tree Ferns 83
BOOK NOTES 63
EDITORIAL 30, 62, 92
INDEX TO RECENT LITERATURE 29, 61, 90

PAGE.

PTERIDOGRAPHIA.

Alaska Fern ... 28
Apogamy in Pellaea ... 57
Bermuda Ferns ... 83
Bracken as a weed, the ... 27
Christmas Fern, Crested ... 80
Club Mosses, New Panama ... 26
Equisetum, A New ... 77
Fern Flora of Indiana ... 81
Fern Pest, A New ... 56
Fern Pests, Additional ... 76
Fern Sports, Two New ... 78
Fern, Walking and Lime ... 50
Ferns as Weeds ... 82
Ferns, Bermuda ... 83
Ferns, Filmy, in Dry Regions ... 26
Ferns, Florids, New Stations for ... 75
Ferns in Bottles ... 75
Ferns, New Southwestern ... 79
Ferns, Number of Articles on ... 76
Ferns Weighing a Ton ... 64
Filmy Ferns in Dry Regions ... 26
Florida Ferns, New Stations for ... 75
Goldie, James, Death of ... 80
Indiana, Fern Flora of ... 81
Lycopodium lucidulum porophylum ... 58
Pellaea, Apogamy in ... 57
Sports, Two New Fern ... 78
Sporophyll Zones ... 59
Stipe or Stipes ... 57
Taenitis, Affinities of ... 59
Walking Fern and Lime ... 56
Woodwardia on Cape Cod ... 28
INDEX TO THE FERN BULLETIN, VOLUMES 11 TO 29. 97

Vol. XX No. 1

The Fern Bulletin

A Quarterly Devoted to Ferns

January

Smithsonian Institution
APR 12 1912
228144
National Museum.

Joliet, Ill.
Willard N. Clute & Company
1912

The Fern Bulletin

A QUARTERLY DEVOTED TO FERNS

AWARDED GRAND PRIZE AT THE PARIS EXPOSITION

20 CENTS A COPY 75 CENTS A YEAR

WILLARD N. CLUTE, EDITOR

To insure subscribers against loss of one or more numbers between the expiration and renewal of their subscriptions the journal will be sent until ordered stopped. All arrearages must be paid. Remittances may be made by money order, stamps, currency or drafts and personal checks drawn on Chicago or New York. Checks on other banks must contain 10 cents for collection.

WILLARD N. CLUTE & COMPANY, PUBLISHERS, JOLIET, ILL.

Entered at the Post Office, Joliet, Ill., as second-class mail matter.

60 YEARS' EXPERIENCE

PATENTS

TRADE MARKS
DESIGNS
COPYRIGHTS &C.

Anyone sending a sketch and description may quickly ascertain our opinion free whether an invention is probably patentable. Communications strictly confidential. HANDBOOK on Patents sent free. Oldest agency for securing patents.

Patents taken through Munn & Co. receive *special notice*, without charge, in the

Scientific American.

A handsomely illustrated weekly. Largest circulation of any scientific journal. Terms, $3 a year; four months, $1. Sold by all newsdealers.

MUNN & Co. 361 Broadway, **New York**
Branch Office, 625 F St., Washington, D. C.

VOLUME VI
Out of Print

It is not likely that there will be any more "last appearances" of Volume VI. The best we can do now is to begin with volume VII. We offer the next 13 volumes (7-19) for $9.00 and will present to each purchaser a copy of 10 year index, Boston Meeting Papers and Ferns of Upper Susquehanna as well as 3 different numbers of Vol. VI. Single volumes 75 cents.

WILLARD N. CLUTE & CO.,
Joliet, Ill.

SOME SPECIAL OFFERS

THIS MAGAZINE ONE YEAR

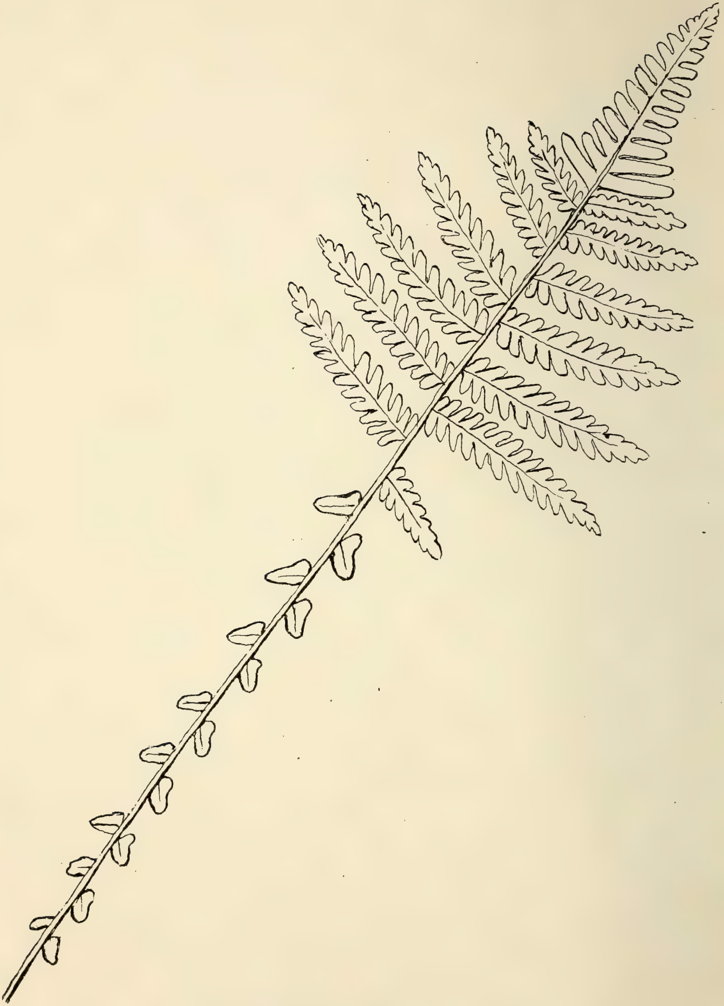
With any back volume later than Vol. 7	$1.25
With any two back volumes later than Vol. 7	1.60
With set of the Fern Bulletin (Vols. 7-18)	8.00
With the New Gray's Manual ($2.50)	3.00
With a Solid Steel Trowel, 8-in. blade, (40c)	1.00

With any Book or Magazine for 50c additional.

N. B.—Above prices are for subscriptions strictly in advance. Personal checks will not be accepted unless cost of collection is added.

Address all orders to

WILLARD N. CLUTE & CO.
JOLIET, ILLINOIS



NEPHRODIUM DELTOIDEUM

THE FERN BULLETIN

Vol. XX JANUARY, 1912 No. 1

THE ROCK RELATIONS OF THE CLIFF-BRAKES.

BY E. J. HILL.

The note under Pteridographia in the *Fern Bulletin* for July,1911,concerning *Pellaea gracilis* on sandstone and its unusual occurrence on any rocks except limestone, reminds me of a similar experience with it, and of another station to be added to the two that are mentioned. In July 1905, on an excursion with the Chicago Academy of Sciences, I collected this fern on a moist, shaded sandstone cliff outcropping on the sides of Liberty Hill, which overlooks the village of Oregon, Illinois. The prevailing rock here is the St. Peters sandstone. The Trenton Limestone lies next above, but did not outcrop at the point where the fern grew. The sandstone is ferruginous, usually soft and friable, but sometimes so hardened by the iron which forms the chief cementing material as to ring like a piece of old casting when struck by a hammer. Such was the character of the sandstone that formed the mass of Liberty Hill. The three other localities in Illinois—the only state in which I have yet found it—Kankakee, and in Cook County,.Lemont and Sag Bridge, were on outcrops of Niagara Limestone.

As the relation of this slender cliff brake as well as of the larger *Pellaea atropurpurea* to the underlying rock is a matter of interest, it may be well to report my experience with this also, and draw some conclusions from their character. In another locality near Oregon on the same excursion, I collected this fern on the sandstone rocks. It was a small colony, the few straggling stems presenting an appearance quite different from the nests or bunches one commonly finds when it grows on limestone. Again, in the summer of 1910, while spending a week studying the flora in the Dells of the Wisconsin river, near Kilbourn, Wis., I saw the cliff brake but once, a small bunch similar to the one at Oregon. The rock of the Dells is the Potsdam sandstone. Once before, in 1893, I took it from the sandstone cliffs bordering Lake Mendota, Madison, Wis. A note made at the time simply gives sandstone cliffs, but does not state whether the plants were growing on the Potsdam or the Madison sandstone, a name applied to a thinner bed in which more calcareous matter is mixed with the ferruginous than is the case with the cementing material of the Potsdam. The bearing of this will appear later on in the discussion. Attention is called to these facts since the common habitat of both the *Pellaeas* is stated to be limestone, or calcareous rocks, implying that lime is the principal ingredient. Gray's New Manual for *P. atropurpurea* specifies "dry calcareous rocks" only, and for *P. gracilis* (*Cryptogramma Stelleri*), "shaded chiefly calcareous rocks," thus according the latter a wider edaphic range. The statements in books that give habitats vary in regard to the ferns, but the more common one, as agrees with experience in general, is calcareous rocks.

In view of these facts and statements, it is well to examine the case more closely and see what are the edaphic and other ecologic relations of the two cliff-brakes. They are characterized in one of their features as growing on rocks. This may not necessarily mean that they are true lithophytes, or rock-plants, with rock as the sole substratum, but such is doubtless the implication when they are discussed in their preferential relations to limestone or sandstone. It would seem to apply in but a very general way to *P. gracilis.* In the strict sense of the term it is not a lithophyte, or plant closely connected with a rock substratum. At least I do not find any connection between its roots and the underlying rock, however otherwise, if at all, they may be related. The roots may casually pass through the thin stratum of soil in which it grows and thus come in contact with the rock, but they show no adhesive nature. The rocks provide a lodging place for this layer of soil in which it takes root and shelters the delicate fronds from adverse conditions. The roots spread in a medium well supplied with humus They are fine, with abundant fibers and root hairs for the absorption of nourishment. Besides it is usually associated with mosses, liverworts and other small plants adapted to such a habitat. These are its edaphic features and relations as I have found them, and from the character of its root-system, it would require essentially the same conditions anywhere. In its relations to moisture it is a mesophyte, since it demands a moderate supply of water. The locality may become dry in late summer from heat or lack of rain, but as it fruits in early summer its season of activity is over, the aerial parts may wither and disappear, and the tiny fronds be hard to find. In its relations to light it is a sciophyte or shade-plant. It is to be sought on shaded rocks, since the direct rays of the sun, which the common cliff-brake readily endures, are detrimental, or might prove fatal.

It is quite different in the case of *P. atropurpurea.* It is true xerophyte, capable of living under the dryest of conditions. It is doubtless a good lithophyte, since any soil but the rock itself that may be found at its root is a negligible factor in its life. All it seems to need is mere cranny or crevice or bit of shelf as a place for adequate fastening. A knife may be required to detach it, quite unlike the easy separation of a sod or bunch of *P. gracilis* with its associated bryophytes from the underlying rock. The roots are relatively coarse, strong and wiry, scantily if at all provided with proper rootlets. Where they come in contact with the rock they usually enlarge or flatten, frequently becoming more or less discoid at the end, perhaps the result of pressure, but useful in the capacity of hold-fasts. The dense cushion of flattened and wrinkled hairs and scales at the base of the stems is well adapted to conserve whatever moisture may have collected about the roots, and to retard its escape except by way of transpiration. The tufted habit, the blue-green color, the thickened or leathery leaf readily inrolling at the edge when the moisture is diminished, bespeak the true xerophyte. These characters are in marked contrast with the thin texture of the leaves, the palegreen or yellowish green color, the scattered habit of the stems of *P. gracilis,* in harmony with its mesophytic nature. Then in its relations to light the cliff-brake likes an open, sunny place, as it is a sun-plant, or heliophyte.

As to the chemical or nutritive relation of these ferns to the rocks with which they are commonly associated, or whether there are any, I have no data at hand to decide, nor do I know that it has ever been investigated experimentally. Such should prove a crucial test. That plants have peculiar relations of this kind to soils is generally acknowledged. This is evident from the names applied to plants characteristic of certain habitats, or to their likes and dislikes. Thus we find plants denominated halophilous, or lovers of salt, calciphilous and calciphobous, loving, or dreading and avoiding lime, respectively; silicolous, such as live on a silicious substratum, or in a soil abounding in sand, mere dwellers as it were with a somewhat neutral character, since silex as nutrition for plants is on the whole a neutral substance. Some regard a calciphobous plant as in a sense the equivalent of one that is silicolous. This is explained by saying that plants do not avoid a calcareous and select a silicious soil, but are driven by competition with other plants away from a soil well supplied with calcium and usually richer, into one with much less of this element, such as a very sandy soil. Here may be found enough of calcium for actual needs, since they can do with less, and in addition are freed from competitors that are not so easily satisfied. This, on the whole, seems a more satisfactory explanation of the relations. As far as experiments upon the relations of plants to their habitats have been made, they appear to be determined more by the physical than by the chemical constitution of the soil, provided that it contains the ingredients a plant requires, and does not have in excess those that are injurious.

In accordance with this explanation, the two ferns, commonly calcicolous but sometimes silicolous, may be more closely related to this underlying rocks physically than chemically. If this need of calcium is greater than that of plants in general, it would have a bearing on their habitats. But *P. atropurpurea,* at least, since it lives in exposed places, must have a better chance to resist physically adverse conditions affecting its stability on a firm limestone basis than on the more readily disintegrating sandstone. In this way its infrequency on sandstone rocks may in a measure by explained.

Chicago, Ill.

THE FERN FLORA OF MICHIGAN

BY C. K. DODGE.

As one will see by referring to the map, Michigan in so many respects, is naturally one of the most favored spots known in the world. It is bordered and almost surrounded by four out of the five Great Lakes and their connecting streams, has over 1600 miles of coast line, perhaps over 5,000 small lakes, numerous small rivers, and consists of two main parts usually referred to as the Upper Peninsula and the Lower Peninsula. The State, large in area but very irregular in outline, lies between latitude 41°-45′ and 48°-20′, and longitude 82°-25′ and 90°-34′ and between these northern and southern parts, the temperature varies more than 7 degrees. The area approximates 58,900 square miles or 37,705,000 acres. It will be seen at once that a careful examination and study of the distribution of species from north to south will be very interesting and profitable.

To those not familiar with the whole history of the State, it appears very strange how two such large bodies of country, but so different in every respect and divided into two irregular parts by large lakes and straits, came to be joined together politically as one State. The circumstances and incidents bringing it about have passed into legend and history. It is seldom a Michigan historian treats the matter with seriousness, but rather makes light of the whole affair. It seems that Michigan was about to be admitted into the Union with a territory covering only the Lower Peninsula, when a lively dispute arose between Ohio and Michigan as to the boundary, which involved the possession of an east and west narrow strip of land covering in part the place where Toledo is situated. The kindly counsel of Uncle Sam was offered and finally agreed to, giving the strip in dispute to Ohio, while to Michigan was given the large area now usually called the Upper Peninsula. Ohio now has the strip of land with the great and progressive city of Toledo. Michigan has the Upper Peninsula with its many prosperous cities and immense mineral wealth. Both parties are happy. It is said "All's well that ends well."

But for want of space we cannot stop here to talk much about doubtful legends or State history, nor can we speak of its soils or interesting geology. The two peninsulas are very unlike. The Lower Peninsula is generally regarded as a level country, although very hilly in many places. On the west end of Lake Erie and from the foot of Lake Huron at Port Huron along the shore to Mackinaw City, sand dunes, seldom rising to the height of 40 feet, are numerous but mostly fixed and covered fairly well with vegetation. On the west side along the Lake Michigan shore from Mackinaw City to the south boundary, a part of which is so celebrated for fruit raising, sand dunes in many places are much more formidable, in some cases 400 feet and more in height, often changing location, invading and burying forests. The Upper Peninsula is in many places very rough and rocky with numerous deep, shaded and damp ravines, but is not considered as generally mountainous. In the northern part of Marquette county, in Keweenaw county, and in parts of Houghton and Ontonagon counties, the higher hills and rocks, usually parallel with the Lake Superior shore, are so rough and formidable as to be regarded by many as mountains. But the only genuine mountains in the State, are the Porcupines in the western part of Ontonagon county and extending into Gogebic county, near the Lake Superior shore, which rises over 1,000 feet in height. Small streams, often cut deep into the drift and rock, are numerous, and damp rocky places are very abundant throughout. It would seem to be an ideal country for fern species, yet as will be noticed by referring to the list, reports are very meager.

So far as known there has been no systematic search for ferns throughout the State, or in localities of any size. No sooner does a botanist become prominent in this state than he is employed by the government, some prominent business interest, or educational institution, where his duties are such that he has little time for field work. No particular branch or line in the botany of this state has ever been well looked up except here and there in restricted areas. What should have been done or started over 50 years ago is yet left undone. This is especially the case with the Upper Peninsula. Much of what has been accomplished has been the work of outside botanists. In the last edition of the Michigan Flora appearing in 1904, after recounting what had already been done, Prof. W. J. Beal, then at the Michigan Agricultural College, said: "After all has been said and done, the study of the flora of the state at best can only be considered as fairly begun. By far the greater areas have not yet been seen by any systematic botanist and very few regions have been visited by one who is an expert in some one or more of the more difficult families." It is certain that the distribution of plants in this state has been uniformly neglected.

In the following list much valuable assistance has been received from O. A. Farwell, of Detroit, who has given much attention to the ferns of the state as well as to other plants.

POLYPODIACEAE.

POLYPODIUM VULGARE L. Common polypody. Not frequent in the Lower Peninsula, but plentiful on the edge of overhanging rocks along Lake Huron shore near Hat Point, Port Austin and Point aux Barques, Huron Co.; Grand Ledge, Eaton Co., *W. J. Beal;* near Hubbardston, Ionia Co., *C. F. Wheeler.* Said to be common throughout the Upper Peninsula.

PHEGOPTERIS POLYPODIOIDES Fée. Long beech-fern. In Lower Peninsula near Inland, Grand Traverse Co.; on rocks near Grand Ledge, Eaton Co.; Frankfort, Benzie Co.; Huron Co. *Dodge;* in Upper Peninsula on Isle Royale in Lake Superior, *Dr. A. B. Lyons;* Keweenaw Co., *O. A. Farwell.* Said to be generally common northward.

PHEGOPTERIS HEXAGONOPTERA (Michx.) Broad beech-fern. One fine specimen only found in rich woods near Port Huron, St. Clair Co.; Flint, Genesee Co.; Hubbardston, Ionia Co.; Ann Arbor, Washtenaw Co.; Keweenaw Co. in the Upper Peninsula, *O. A. Farwell.* Said to be frequent in the State.

PHEGOPTERIS DRYOPTERIS (L.) Oak fern. Frequent in St. Clair Co. and reported to be common throughout the State farther north and west. "The commonest form in Keweenaw Co." *O. A. Farwell.*

ADIANTUM PEDATUM (L.) Maidenhair. Common throughout the State, usually in damp rich and shaded ground.

PTERIS AQUILINA (L.) Common Brake. Abundant throughout the State in open dry ground or in swamps where it is often rank and much larger.

Pellaea atropurpurea (L.) Purple Cliff-brake. Near Norway in Dickinson Co., Upper Peninsula. Apparently rare.

Cryptogramma acrostichoides (R. Br.) American Rock-brake. Found only in crevices of rocks on Isle Royale and Caribou Island in Lake Superior.

Cryptogramma stelleri (Gmel.) Slender Cliff-brake. South shore of Lake Superior; Pictured Rocks in Alger Co., Upper Peninsula, *G. H. Hicks.*

Woodwardia virginica (L.) Virginia chain-fern. In swampy ground, St. Clair Co.; Huron Co. Frequent throughout the State.

Woodwardia areolata (L.) Net-veined Chain-fern. South Haven in Van Buren Co., *L. H. Bailey.* Apparently rare.

Asplenium trichomanes (L.) Maidenhair spleenwort. In crevices of rocks, Houghton Co. and Keweenaw Co. in Upper Peninsula and on Isle Royale in Lake Superior.

Asplenium platyneuron (L.) Ebony spleenwort. Near Allegan, Allegan Co., *Miss Josie A. Williams;* near Williamston, Ingham Co., *O. A. Farwell.* Only stations known in the State.

Asplenium montanum (Willd.) Mountain spleenwort. Near Clifton, Upper Peninsula, *O. A. Farwell.*

Asplenium ruta-muraria (L.) Wall rue spleenwort. Keweenaw Co., Upper Peninsula, *O. A. Farwell.* Apparently rare.

Asplenium angustifolium (Michx). Narrow-leaved spleenwort. Shaded banks of Black river, St. Clair Co., but rare; rich woods in Jackson Co., *S. H. & D. R. Camp;* Washtenaw Co., Genesee Co. Apparently infrequent.

ASPLENIUM ACROSTICHOIDES (Sw.) Silvery spleenwort. Alma, Gratiot Co., *C. A. Davis.* Said to be frequent throughout the State.

ASPLENIUM FILIX-FOEMINA (L.) Lady fern. Very common throughout the State. The form *angustatum* is common in the Upper Peninsula, *O. A. Farwell.*

CAMPTOSORUS RHIZOPHYLLUS (L.) Walking fern. Alpena Co., in Lower Peninsula, *V. M. Spalding.* Keweenaw Co., *O. A. Farwell;* near Norway, Dickinson Co., Upper Peninsula, *C. F. Wheeler.* Apparently rare.

POLYSTICHUM ACROSTICHOIDES (Michx.) Christmas fern. Shaded ground and river banks throughout the State.

POLYSTICHUM LONCHITIS (L.) Holly fern. Woods, south shore of Lake Superior; Keweenaw Co., Upper Peninsula, *O. A. Farwell.*

POLYSTICHUM BRAUNII (Spenner.) Braun's holly-fern. Keweenaw Co., Upper Peninsula, *O. A. Farwell.* Apparently rare.

NEPHRODIUM THELYPTERIS (L.) Marsh shield-fern. Very common throughout the State in damp open or shaded ground.

NEPHRODIUM SIMULATUM (Davenp.) Massachusetts shield-fern. Belle Isle, Detroit, Wayne Co., *O. A. Farwell.*

NEPHRODIUM NOVEBORACENSE (L.) New York fern. In damp woods, St. Clair Co., Washtenaw Co.; Macomb Co.; Ionia Co.; Manitoulin Island.

NEPHRODIUM FRAGRANS (L.) Fragrant shield-fern. Isle Royale in Lake Superior; Keweenaw Co., Upper Peninsula, *Dr. Lyons.*

Nephrodium marginale (L.) Evergreen wood-fern. Shaded hillsides, river banks and rich woods throughout the State.

Nephrodium filix-mas (L.) Male fern. Keweenaw Co., Upper Peninsula. Apparently rare.

Nephrodium Goldieanum (Hook.) Goldie's fern. Black river bottom in St. Clair Co.; Genesee Co.; Ionia Co., *C. F. Wheeler;* Shiawassee Co., *G. H. Hicks;* Gratiot Co., *C. A. Davis.* Oakland Co., *Brotherton* and *Farwell.*

Nephrodium Boottii (Tuckerm.) Boott's shield-fern. In alder thickets, Ionia Co., Washtenaw Co., Lower Peninsula. Near Norway Dickinson Co., *C. F. Wheeler.* Keweenaw Co., Upper Peninsula, *O. A. Farwell.*

Nephrodium cristatum (L.) Crested shield-fern. Frequent in swampy places throughout the State.

Nephrodium cristatum Clintonianum (D. C. Eaton.) Clinton's shield-fern. Frequent in rich woods in St. Clair Co. and Huron Co.; Washtenaw Co.; Ionia Co.; Gratiot Co., *C. A. Davis.*

Nephrodium spinulosum (Muller.) Spinulose shield-fern. Rich woods in St. Clair Co. Common throughout the State.

Nephrodium spinulosum intermedium (Muhl.) Spinulose shield-fern. Common in rich woods throughout the State.

Nephrodium spinulosum dilatatum (Hoffm.) Spinulose shield-fern. Not noticed in St. Clair Co. Washtenaw Co.; Macomb Co.; Genesee Co.; Ionia Co.; Emmet Co.; and southward. The Michigan plant is referable to the form *Anadenium* Robinson.

Cystopteris bulbifera (L.) Bladder fern. Frequent throughout the State in damp rich woods and on moist shaded hillsides.

CYSTOPTERIS FRAGILIS (L.) Brittle fern. In damp woods and under overhanging rocks throughout the State. The form *dentata* is found in Washtenaw Co., Lower Peninsula and in Keweenaw Co. Upper Peninsula and probably occurs throughout the State. *O. A. Farwell.*

WOODSIA ILVENIS (L.) R. Br. Rusty woodsia. Near Norway, Dickinson Co., Upper Peninsula, *C. F. Wheeler.* Common in Upper Peninsula.

WOODSIA ALPINA (Bolton.) Alpine woodsia. Keweenaw Co., Upper Peninsula, *O. A. Farwell.* Apparently rare.

WOODSIA OBTUSA (Spreng.) Blunt-lobed woodsia. Abundant in crevices of overhanging rocks, Lake Huron shore near Port Austin, Huron Co., *C. A. Davis.* Said not to be rare in the Upper Peninsula.

WOODSIA OREGANA (D. C. Eaton.) Oregon Woodsia. South shore of Lake Superior in the Upper Peninsula.

WOODSIA CATHCARTIANA (Robinson). On rock of the lower falls of the Menominee river in the Upper Peninsula, *C. F. Wheeler.* Originally reported as *Woodsia scopulina.*

DICKSONIA PUNCTILOBULA (Michx.) Hay-scented fern. Emmet Co., in Lower Peninsula; Keweenaw Co., in Upper Peninsula, *O. A. Farwell.*

ONOCLEA SENSIBILIS (L.) Sensitive fern. Abundant in damp open or shaded ground throughout the State.

ONOCLEA STRUTHIOPTERIS (L.) Ostrich fern. Abundant on Black river bottom in St. Clair Co.; Lapeer Co.; Huron Co.; Tuscola Co. Occasional throughout the State.

OSMUNDACEAE.

Osmunda regalis (L.) Royal fern. Flowering fern. Common about marshy places and in swamps throughout the State.

Osmunda Claytoniana (L.) Clayton's fern. Common throughout the State in damp open or shaded ground.

Osmunda cinnamomea (L.) Cinnamon fern. Common in open or shaded ground, swampy places and on damp shaded banks throughout the State.

OPHIOGLOSSACEAE.

Ophioglossum vulgatum (L.) Adder's tongue. Abundant in meadow-like ground on Harsen's Island, one of the delta islands formed by the mouths of St. Clair river in St. Clair Co. Manistee Co., *F. P. Daniels;* Washtenaw Co.; Ingham Co. Keweenaw Co. in the Upper Peninsula, *O. A. Farwell.* Very probably overlooked in many places.

Ophioglossum Engelmanni (Prantl.) Engelmann's adder tongue. Keweenaw Co. in the Upper Peninsula, *O. A. Farwell.*

Botrychium lunaria (L.) Moonwort. Near Harrisville, Alcona Co., Lower Peninsula, *W. J. Beal;* Keweenaw Co. in the Upper Peninsula, *O. A. Farwell.*

Botrychium simplex (E. Hitchcook.) Little grapefern. Iosco Co. in the Lower Peninsula. Keweenaw Co. in the Upper Peninsula, *O. A. Farwell.* Said to be rare in this State. The form *subcompositum* reported from Keweenaw Co., Upper Peninsula by *O. A. Farwell.*

BOTRYCHIUM LANCEOLATUM (Gml.) Lance-leaved grape-fern. In damp mossy places in the Upper Peninsula, *H. Gillman.* Keweenaw Co. in the Upper Peninsula, *O. A. Farwell.*

BOTRYCHIUM MATRICARIAEFOLIUM (A. Br.) Matricary grape-fern. Keweenaw Co. in the Upper Peninsula, *O. A. Farwell.* The form *neglectum* is the common form in Keweenaw Co., Upper Peninsula, *O. A. Farwell.*

BOTRYCHIUM OBLIQUUM (Muhl.) Ternate grape-fern. In damp open woods and thickets near Port Huron in St. Clair Co.; Genesee Co.; Van Buren Co., *Bailey;* Washtenaw Co.; Gratiot Co.; Wayne Co., *O. A. Farwell.* Also in Keweenaw Co., Upper Peninsula, *O. A. Farwell.* The forms *Matricariae,* and *rutafolium* are reported from Keweenaw Co., Upper Peninsula by *Farwell.*

BOTRYCHIUM OBLIQUUM DISSECTUM (Spreng.) Ternate grape-fern. St. Clair Co., but rare, *J. W. Stacy;* Van Buren Co., near Detroit, Wayne Co., *A. F. Foerste;* Gratiot Co., *C. A. Davis.*

BOTRYCHIUM TERNATUM INTERMEDIUM (D. C. Eaton) Ternate grape-fern. Keweenaw Co., Upper Peninsula,*O. A. Farwell.* Charity Island, Saginaw Bay, *Dodge.* Oakland Co., Lower Peninsula, but rare, *O. A. Farwell.*

BOTRYCHIUM VIRGINIANUM (L.) Rattlesnake fern. Common in rich woods and thickets throughout the State. The variety *gracile* is reported from Keweenaw Co. by *Farwell.*

EQUISETACEAE.

EQUISETUM ARVENSE (L.) Common horsetail. Common in damp sandy open or shaded ground and on railway embankments throughout the State. The forms *riparium, campestre, medium, decumbens* and *nemorosum* are common throughout with the type.

Equisetum telmateia (Ehrh.) In cold alder thickets, Keweenaw Co. Rare. *O. A. Farwell.*

Equisetum pratense (Ehrh.) Thicket horsetail. Not yet noticed in St. Clair Co. Macomb Co.; Genesee Co.; Emmet Co. in Lower Peninsula. Keweenaw Co., Upper Peninsula; *O. A. Farwell.*

Equisetum sylvaticum (L.) Wood horsetail. Very common in St. Clair Co.; Washtenaw Co., rare; Clinton Co.; Montcalm Co.; Genesee Co., frequent north and west throughout the State.

Equisetum palustre (L.) Marsh horsetail. Said to be about Lake Huron and in the Upper Peninsula.

Equisetum littorale (Kuhlewein.) Shore horsetail. Near New Buffalo, Berrien Co.; Iosco Co., in Lower Peninsula. Keweenaw Co. in Upper Peninsula, *O. A. Farwell.*

Equisetum fluviatile (L.) Swamp horsetail. Pipes. In muddy places and shallow water throughout the State. The forms *polystachum* and *limosum* are reported with the type.

Equisetum laevigatum (A. Br.) Smooth scouring rush. This species apparently very doubtful. Reported from Manistee Co. by H. P. Daniels. Specimens collected in St. Clair Co., Michigan and Lambton Co., Ontario by the writer, at first receiving this name by the late Prof. C. F. Wheeler and the late A. A. Eaton, were afterward named *E. hyemale intermedium* A. A. Eaton and so distributed to fern students and the herbariums of the United States. It was said that *E. laevigatum* would probably not be found in this state, but that it was abundant farther west.

EQUISETUM HYEMALE (L.) Scouring rush. Common throughout the State on damp river banks and damp shaded ground. The forms *affine* and *robustum,* are reported from St. Clair county and vicinity.

EQUISETUM HYEMALE INTERMEDIUM (A. A. Eaton.) Scouring rush. Quite frequent and often abundant in dry poor ground in St. Clair, Sanilac, Huron, Tuscola, Lapeer and Macomb counties, and the eastern half of the Lower Peninsula so far as yet examined.

EQUISETUM VARIEGATUM (Schleich.) Variegated Equisetum. Common in damp sand about the shores of the Great Lakes and often on borders of marshes. The exact type of this species for this region according to the late A. A. Eaton, was found not far from the Lake Huron shore at Port Franks, Lampton Co., Ontario on the edge of a lagoon or one of the closed mouths of the Aux Sables river. The form *Jesupi* is the common form within 50 to 75 miles of Port Huron in St. Clair county, usually in poor shaded ground. Very probably to be found throughout the State. The form *Nelsoni* is accredited to Michigan by the late A. A. Eaton, but has not been otherwise reported so far as known to the writer.

EQUISETUM SCIRPOIDES (Michx.) Sedge-like equisetum. In shaded ground throughout the State. Too often overlooked.

LYCOPODIACEAE.

LYCOPODIUM SELAGO (L.) Fir club-moss. Keweenaw Co., Upper Peninsula, *O. A. Farwell.*

LYCOPODIUM LUCIDULUM (Michx.) Shining Club-moss. Frequent in moist woods throughout the State.

Lycopodium lucidulum porophilum (Lloyd and Underw.) Rock club-moss. Reported from Keweenaw Co., Upper Peninsula by *O. A. Farwell.*

Lycopodium inundatum (L.) Bog club-moss. Along Willow river, Huron Co., Lower Peninsula according to the last Michigan Flora; Sugar Island, Chippewa Co., and Keweenaw Co., Upper Peninsula, *O. A. Farwell.*

Lycopodium annotinum (L.) Stiff club-moss. Occasional in shaded ground, St. Clair Co., and reported as common throughout the State.

Lycopodium alpinum (L.) Alpine club-moss. Keweenaw Co., Upper Peninsula, and banks of Montreal river, *O. A. Farwell.*

Lycopodium clavatum (L.) Common club-moss. Frequent in dry woods throughout the State.

Lycopodium clavatum monostachyon (Grev. and Hook.) Club-moss. Keweenaw Co., Upper Peninsula, *O. A. Farwell.*

Lycopodium obscurum (L.) Ground Pine. Reported in last Michigan Flora as found in moist woods. Common in Keweenaw Co., Upper Peninsula, *O. A. Farwell.*

Lycopodium obscurum dendroideum (Mich.) Ground pine. Frequent in moist woods and on open hillsides throughout the State.

Lycopodium sabinaefolium (Willd.) Cedar-like club-moss. Keweenaw Co., Upper Peninsula, *O. A. Farwell.*

Lycopodium complanatum (L.) Trailing Christmas-green. Frequent in shaded ground throughout the State.

LYCOPODIUM COMPLANATUM FLABELLIFORME (Fernald.) Ground pine. The common form in Keweenaw Co., Upper Peninsula, *O. A. Farwell.*

LYCOPODIUM TRISTACHYUM (Pursh.) Trailing club-moss. Noticed by C. A. Davis on sand dunes near Port Crescent, Huron Co., Lower Peninsula. Keweenaw Co., Upper Peninsula, *O. A. Farwell.*

SELAGINELLACEAE.

SELAGINELLA SELAGINOIDES (L.) Low selaginella. Isle Royale in Lake Superior and Keweenaw Co., Upper Peninsula, *O. A. Farwell.*

SELAGINELLA RUPESTRIS (L.) Rock selaginella. Genesee Co.; Clinton Co., *C. F. Wheeler;* Iosco Co.; Crawford Co.; Clare Co., *W. J. Beal,* in Lower Peninsula. Keweenaw Co., Upper Peninsula, *O. A. Farwell.*

SELAGINELLA APUS (L.) Creeping selaginella. Frequent in St. Clair Co. and in Oakland Co., Lower Peninsula, *O. A. Farwell.* Believed to be quite common throughout the State, but often overlooked.

ISOETACEAE.

ISOETES MACROSPORA (Dur.) Lake quillwort. Abundant in the waters of St. Clair river about Algonac in St. Clair Co., *W. S. Cooper.* St. Mary's river near Sault Ste Marie, Chippewa Co., Upper Peninsula, *T. C. Porter.*

ISOETES ECHINOSPORA BRAUNII (Dur.) Braun's quillwort. Reported as found in the Upper Peinsula.

Port Huron, Mich.

NEPHRODIUM DELTOIDEUM

BY WILLARD N. CLUTE.

When the collector finds his first specimen of *Nephrodium deltoideum* he can hardly believe that he has found a perfect frond. The small green ears that parallel the rachis in the lower half of the frond are so unlike the other pinnae and the break between the two forms is so sudden and emphatic that it seems easier to assume that these stubby pinnae have been stunted as the result of injury by fungi or insects. Further search, however, only results in the discovery of more fronds of exactly the same pattern, and convinces the collector that he has in hand one of the most curious of the wood ferns.

Nephrodium deltoideum is a native of the West Indies where it grows on the wooded foot hills much as our common wood-ferns grow in the forests of the Eastern United States. When only the upper half of the fronds is seen the fern has no special individuality. It is likely to remind the observer of the common marginal shield fern (*Nephrodium marginale*). But once the whole frond is brought into view its very characteristic from makes it a well-marked species and one that even the novice cannot go astray in identifying. Although its allies give some indication of a reduction of the lower pinnae in their fronds there appear to be none in which the departure in this direction is half as strongly emphasized.

Like practically all the ferns in which the chlorophyll-bearing tissue is reduced in the lower half of the frond, the leaves are produced in circles. The reduction in leaf surface is regarded as an adaptation to light conditions since the upper pinnae are likely to shade those below, but the reduction may have been brought about also by the necessity for economizing space when several fronds grow in a tuft.

Full grown specimens of this fern may reach a height of three feet though the majority are somewhat shorter. The number of ear-like pinnae varies, but the ears are always more numerous than those pinnae that are of the more conventional pattern. The whole frond is rather stiff and leathery as are those of most terrestrial species which grow in the dryish woodlands in the tropics. The particular specimen from which our illustration was made was collected by the writer at Moore Town in the island of Jamaica where it was fairly common in woods and thickets.

THE OSMUNDAS

BY ADELLA PRESCOTT.

The Osmundas on account of their large size are are among the most noticeable of our ferns. In their native haunts they have a stateliness and grace that is not exceeded by any of our other species, but those who are tempted by these considerations to remove them for the decoration of their house grounds are likely to be sadly disappointed. While they will live in almost any location they thrive only where there is an abundance of moisture and in the dry soil surrounding most houses make but a dwarfed and stunted growth.

This is especially true of the cinnamon and royal ferns which reach their greatest perfection in swamps or beside sluggish streams; the interrupted fern grows on dryer soil and will develop very well where the others make but a poor showing.

The collector really deserves better success than he is apt to get, for the digging of these deeply rooted plants is a task not to be lightly undertaken, and when as sometimes happens, the root gives way suddenly seating the strenuous digger unexpectedly on the ground his enthusiasm as well as his clothing is apt to be dampened, for the time being at least.

The cinnamon fern (*Osmunda cinnamomea*) is one of our commonest ferns being found in large quantities in swampy lands throughout the Eastern States. Its stout crosiers are covered thickly with white wool, tiny tufts of which are found at the base of each pinnule of the mature frond though the color has here changed from silvery white to tawny brown. The sterile fronds are once pinnate with deeply lobed pinnules, the pinnules being more pointed than in its relative the interrupted fern. They grow in a circular or vase shaped chump, are from two to six feet in height and a soft light green in color. The fertile fronds look very different, being much shorter, stiff, cub-like and cinnamon-brown in color and are very noticeable among the soft greens of early summer. But for all their different appearance these club-like fronds are really the counterparts of the sterile fronds with reduced area and covered with sporangia. When the spores are shed, the fertile spikes wither and soon disappear. The rootstock is large and one end is annually renewed by fresh crowns of fronds while the other gradually dies. If no disaster overtakes the plant it may live to extreme age. It is found from Nova Scotia southward and in the West Indies as well.

The interrupted fern (*Osmunda Claytoniana*) is by no means uncommon in the eastern states, but is often passed by unnoticed because of its resemblence to the cinnamon fern. The first specimens I ever saw were brought from Vermont and I was assured that it did not grow in this State, but a few weeks later I found a fine specimen by the roadside a few miles away and still later found many vigorous clumps in an old pasture beside an old wall and around piles of stone. In spite of its resemblence to the cinnamon fern there are many little points of difference and when they are in fruit there is no mistaking them. Generally speaking it is a little more slender and delicate in appearance than the cinnamon fern. The crosiers are not so woolly and they lack the tiny tuft at the base of the pinnules but the habit of growth is similar in both species. The fertile fronds are taller than the sterile and both are oblong lanceolate in shape with pinnatified, blunt-lobed pinnae. The spore bearing organs are near the middle of the frond and are very like the fruiting pinnae of the cinnamon fern, but seem such an out of place "interruption" of the green frond that they are often taken for dwarfed and blighted pinnae rather than the reason for being of the fern. The fertile part early withers and falls leaving a bare space on the rachis which emphasizes the common name.

The flowering fern (*Osmunda regalis*)—for whatever the hair-splitting among botanists the beauty of our fern makes it truly royal—is common both in Europe and America, though it is so unlike most of our ferns in appearance that I fancy many pass it unthinkingly. The first one that I saw was a stunted specimen growing beside a house a forlorn plant with no suggestion of royal lineage. But I learned the look of it and when later I saw beside the road a lusty plant six feet or more in height and nearly as much in diameter, I knew it at once, though the abundant supply of water had so greatly increased its size. The large twice pinnate fronds are a beautiful cool, green with a dark shining rachis gleaming through the green pinnae. The blade is divided into several pairs of opposite branches, each of which has six or more pairs of slightly stalked oblong pinnules with finely toothed margins. Fertile and sterile fronds are alike except that in the fertile fronds the upper pinnae are changed into spore-bearing organs after the manner of the interrupted fern and like that relative shows many irregularities of form, obtusilobata forms being not uncommon. It is found very commonly in the Eastern States and in some parts of the Northwest. It may be looked for in half-shaded swamps and if cultivated must have an abundance of water if it is to achieve the grace and distinction associated in our minds with royalty.

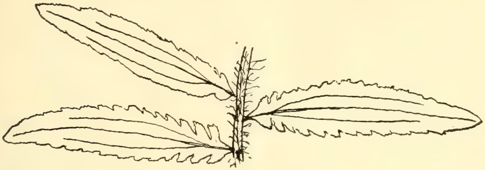
New Hartford, N. Y.

RARE FORMS OF FERNWORTS--XXI.

ANOTHER FORM OF THE CHRISTMAS FERN.

Given a species common enough and the varieties or forms of it that may be found will depend a good deal upon the energy and persistence of the one making the search. Even without special search odd forms occasionally turn up and this is the case with the one under discussion for which the name *lanceolatum* is proposed. It was found at Fairfield, Conn., by E. H. Eames nearly ten years ago. Several specimens were collected but a subsequent trip for more failed to locate the specimens if indeed, they had not reverted to the type.

The form *lanceolatum* is characterized by the lack of the ear-like pinnule at the base of each pinna and is the only form thus far reported which makes this departure from the normal. Toward the base of each pinna the margin breaks up into small toothed lobes and there are indications that very little inducement would be needed to make it pinnatifid. The most singular feature of the plant, however, is found in three veins of almost equal prominence that extend through each pinna. We illustrate the three lowest pinnae from a frond kindly loaned by Mr. W. A. Poyser. The curious lanceolate three veined pinnae persist throughout the frond the only difference apparent is the natural decrease in size as the tip is approached. The specimen was found in rich soil in old woods where the type grew abundantly.



Pinnae of Polystichum acrostichoides lanceolatum.

ADDITIONS TO THE FERN FLORA OF INDIANA

BY E. J. HILL.

The following is a list of additions to the Fern Flora of Indiana which I made on looking over the list in October *Fern Bulletin.*

Ophioglossum vulgatum. I have found this twice in Lake county at the north end of Wolf Lake and a mile or so northwest of Miller. It was in 1897 and 1898.

Nephrodium Goldieanum. In woods, Otis, La Porte county.

Nephrodium spinulosum dilatatum. Dune Park, Porter county.

Selaginella rupestris. Dune Park, Porter county.

Selaginella apus. South side of Deep River, New Chicago, Lake county.

Azolla caroliniana. Stark county, in coves or quiet waters of Kankakee river. South end of English Lake, at the crossing of the Erie railroad about four miles west. Was collected in abundance in 1894.

Chicago, Ill.

PTERIDOGRAPHIA

New Panama Club Mosses.—In "Smithsonian Miscellaneous Collections" volume 56, number 29, W. R. Maxon has described and illustrated three new club mosses from Panama. A single glance at the illustrations shows that these are club-mosses by courtesy only, that is, they do not belong to that group of *Lycopodiums* that bear their sporangia in club-like spikes, but are instead more nearly allied to species like *Lycopodium lucidulum* in which the sporangia are borne in axils of leaves that are otherwise much like those devoted to vegetative functions. A considerable number of tropical *Lycopodiums* are of this type, but unlike more northern species they grow on the trunks and branches of trees instead of on the ground. The most interesting of the recently described species is *L. stamineum* which has leaves scarcely wider than threads.

Filmy Ferns in Dry Regions.—The Hymenophyllaceae or filmy fern family received both its scientific and common names on account of the diaphanous fronds of the various species which in most cases are only a single cell thick and entirely devoid of the water proof epidermis that protects other ferns from evaporation. As a result of such structure, the filmy ferns rarely grow to any considerable size, and in general are restricted to damp and shady places such as ravines and forests. They are commonly found growing on the trunks of trees, rocks and the like and in many ways remind one of the mosses with which they are usually associated. In view of these conditions, therefore, it is somewhat surprising to learn that some filmy ferns, like a few mosses, are able to live in regions where the supply of moisture is extremely limited. One of these is the round-leaved filmy fern (*Trichomanes reniforme*) which in New Zealand has been found growing plentifully upon dry lava rock. Another species *Hymenophyllum sanguinolentum,* which grows with it is usually found in dryish woods, but the round-leaved filmy grows elsewhere in the wettest forests. In the exposed situations on lava rock the fern avoids some evaporation by rolling it fronds, but this cannot prevent almost complete drying out. Possibly it has something of the moss constitution which on occasion can endure almost complete dessication. *Trichomanes reniforme* is remarkable among filmy ferns for having fronds that are four cells thick.

THE BRACKEN AS A WEED.—Those who have occasion to cross the half wild pastures and bushy fields are familiar with the dense growth of bracken that is now and then encountered, but one rarely thinks of it as a noxious weed. In other parts of the world, however, it is less retiring. In British Columbia it is reported as being often higher than a man's head, and in the Southern Hemisphere a closely allied species or variety, *Pteris esculenta,* not only covers considerable areas with its tall fronds, but appears to be disposed to spread into new territory. L. Cockayne writing of it in *The Plant World* says: "No sooner is the forest destroyed in some localities, the heath burned or the moor drained ever so little, than, as if by magic, the bracken fern gains possession of the ground. 'Fern,' to the settler, is a specific term and in a land of ferns refers only to the bracken, which he knows to his cost is so difficult to eradicate. When a bracken heath is well developed, it is a trial both to one's patience and muscles to force a path through the entangled mass of fronds, at times more than man high."

ALASKA FERN.—Most of our readers are doubtless familiar with that interesting form of *Polystichum aculeatum* the fronds of which bear numerous tiny plantlets scattered along the rachis. The fern is usually for sale by florists. A subscriber in Seattle, Washington writes that in his city the plant is known as the Alaska fern.

WOODWARDIA ON CAPE COD.—An article in a recent botanical magazine on the flora of Cape Cod reminded the writer of a walk once taken from the end of crescent-shaped Provincetown toward the ocean. The cart-path followed ran through sand, deep sand—typical Cape Cod sand—than which there is nothing more sandy. This was not always unproductive. There were tangled thickets of thorny smilax and along the railroad which it was necessary to cross, beds of shining bear-berry brilliant with fruit. We did not look for ferns; nevertheless we found them, for suddenly the path led through a boggy place, probably the bed of one of those small ponds which are found among the sand dunes back of Provincetown. There were in the damp way a few plants of *Drosera, Xyris flexusa,* meadow beauty and *Habenaria blephariglottis* and crowding upon them and each other a mass of upstanding fronds of *Woodwardi Virginica.* It was a very happy occasion for the botanical tramp.—*S.*

INDEX TO RECENT LITERATURE

Readers are requested to call our attention to any errors in or omission from, this list.

Bissell, C. H. *A New Locality for Asplenium ebenoides.* American Fern Journal Ja. 1912.—Another Connecticut station.

Clute, W. N. *The Male Fern.* illust. Fern Bulletin O. 1911.

Clute, W. N. *Rare Forms of Fernworts*—XX. *The Forms of Ebony Spleenwort.* illust. Fern Bulletin O. 1911.

Greene, F. C. *The Fern Flora of Indiana.* Map. Fern Bulletin, O. 1911.

Maxon, W. R. *A New Fern from Panama.* American Fern Journal, Ja. 1912.—*Dicranopteris Williamsii* described.

Maxon, W. R. *A New Name for a Hawiian Fern.* illust. American Fern Journal, Ja. 1912.—*Polypodium Saffordii* suggested in place of *P. minimum.*

Pember, F. T. *The Colorado Desert for Ferns.* American Fern Journal, Ja. 1912.

Phelps,, O. R. *A Plea for Fern Protection.* Ameri- Fern Journal, Ja. 1912.

Rugg, H. G. *Random Notes on Bermuda Ferns.* American Fern Journal, Ja. 1912.

Safford, W. E. *Notes of a Naturalist Afloat*—II. illust. American Fern Journal, Ja. 1912.—An occasional reference to ferns.

Waters, C. E. *Evergreen Ferns.* Fern Bulletin, O. 1911.—Reprinted from *Linnaean Fern Bulletin* Vol. 4.

EDITORIAL

Ten years ago, the late Benjamin D. Gilbert, wishing to have a more extended list of references to the fern literature of the preceding decade, than is given in our table of contents, made a very comprehensive index to the first ten volumes of this magazine which was subsequently published by the Linnaean Fern Chapter and is known as "the ten-year Index." Now that the close of another ten year period is fast approaching, some of our readers have suggested that another index of the kind would be desirable. With this opinion we are inclined to agree, but the editorial time is so heavily mortgaged to other things for some time to come that we can scarcely promise it. If anyone among our readers cares to undertake the task we will be glad to render every assistance in our power, supplying extra copies of the magazine and the former index, and when completed publishing the index as the work of the compiler and supplying him extra copies for his own use. There are two ways in which this index may be offered to readers: It may, like the previous index, be offered for sale at 25 cents a copy, or it might be printed as the last number of the 20th volume and sent to members without extra charge. We would be glad of an expression of opinion from our readers on this subject.

* * *

In the recent Annual Report of the American Fern Society, the statement is made that ninety cents out of each dollar paid in by members, is set aside for running the Society's "official organ." Since this particular publication is exactly the same size as The *Fern Bulletin* and is issued the same number of times a year, the extra cost of running it compared with what was formerly paid would seem to be due to inefficiency somewhere. The Fern Society exists ostensibly to help along the study of ferns, but how the study can be helped much on an income of ten cents a member is a puzzle which we are quite willing to let the officers figure out—it is too much for us. As a matter of fact, the Fern Society has done nothing in the past three or four years to advance the study of ferns or to deserve the support of fern students. There seems to be a lack of any settled policy for advancement and the Society runs along chiefly through the momentum acquired when fern study was younger. Either the "official organ" should get down to business and discuss American ferns and other things of interest to American fern students, or it should ask less assistance from the treasury. A Society that exists only to publish an "official organ" has a serious attack of the dry rot.

* * *

So far as known to us, there are but thirty-one comple sets of this magazine in existence. One fortunate New Yorker has, by the exercise of considerable correspondence, accumulated two sets and the editor also had two up to the present. One of these latter, however, has now gone abroad and will hereafter be held in Berlin. There is but one other complete set owned on the other side of the world. This is in the possession of M. C. Belhatte of Paris. In the past we have had many orders for full sets from foreign correspondents, but of course have been unable to fill them. The set just disposed of was the one used for reference in the office of this magazine but which, in view of the approaching consolidation of the magazine with *American Botanist,* was one that could now be spared. It is probably too late now to hope for further complete sets though several readers of this magazine have various odd numbers that if combined would possibly make one or more complete sets. If anybody has numbers earlier than volume VI which they are willing to sell we shall be glad to hear from them.

* * *

There is no use trying to stop when one has the habit! We expressly stated in the October issue of this magazine that we desired subscribers to pay only to the end of 1912,but as usual a considerable number of renewals were for a year and a half or two years in advance. We have credited our subscribers with the amounts sent and at the end of the year, when this magazine becomes part of a larger publication, we will either extend subscriptions to the new magazine or refund the money as desired. Therefore: send as much money as you wish in renewing. It will be as safe with us, and as get-at-able as if in a bank.

* * *

Mr. W. N. Steil of the University of Wisconsin located at Madison, Wis., is making a study of apogamy and apospory in ferns and is very anxious to obtain spores of *Pellaea gracilis* and other species of *Pellaea* except *P. atropurpurea*. Since it is spores rather than fertile fronds that are wanted it is possible that some of our readers may be able to accommodate him. Even if the fronds have been promised elsewhere in exchange the spores that may be found in the collecting papers will answer the purpose, though Mr. Steil prefers the fertile fronds. Mr. Steil is willing to pay anyone who is able to secure the desired material for him and we trust that those having access to the species in question will communicate with him.

All the American Fern Books

Ferns of Kentucky 12mo	(out of print)
Ferns of North America 2 vols. 4to	(out of print)
Fern Collector's Handbook 4to	(out of print)
Ferns in their Homes and Ours	(out of print)
Our Ferns in Their Haunts 8vo.	$2.15
How to Know Ferns 12mo.	1.60
Fern Collector's Guide 12mo	.54
Who's Who Among the Ferns 12mo	1.05
How Ferns Grow 4to	3.25
Ferns and How to Grow Them 12mo.	1.17
Fern Allies of N. Am. 8vo.	2.15
Our Native Ferns 12mo	1.08
Ferns and Allies of New England 16mo.	.50
New England Ferns and Allies 12mo.	1.33
Ferns 4to	3.30
Ferns of the West 8vo. paper	.50
Ferns of Iowa 8vo. paper	.25
North American Pteridophytes paper	.25
How Ferns Grow 4to	3.25
Ferns 4to	3.30
Fernwort Papers 12mo paper	.25
Boston Meeting Paper 12mo paper	.25
Index to Vols. 1-10 Fern Bulletin	.25
Ferns of Upper Susquehanna	.25
Mosses and Ferns 8vo. 1st Ed.	4.00

Any of the above, to which a price is attached will be sent postpaid upon receipt of price.

ADDRESS

Willard N. Clute & Co.

JOLIET, ILL.

WHY OWN WEBSTER'S NEW INTERNATIONAL DICTIONARY THE MERRIAM WEBSTER?

Because it is a NEW CREATION, covering every field of the world's thought, action, and culture. *The only new* unabridged dictionary in many years.

Because it defines over *400,000 Words;* more than ever before appeared between two covers. *2700 Pages. 6000 Illustrations.*

Because it is the *only* dictionary with the new divided page. A "Stroke of Genius."

Because it is an encyclopedia in a single volume.

Because it is commended by the Courts, the Schools, and the Press as *the one supreme authority.*

Because he who knows *Wins Success.* Let us tell you about this new work.

WRITE for specimens of the new divided page.
G. & C. MERRIAM CO., Publishers, Springfield, Mass.
Mention this paper, receive FREE a set of pocket maps.

The American Botanist

For the plant student, amateur or professional. Those who are not subscribers fail to realize the pleasure they are missing. Send for a sample and judge for yourself. Subscriptions 75 cents a year.

Willard N. Clute & Co.

Joliet, Ill.

Reduced Prices

on Microscopes

Lenses and Accessories

Photographic Cameras

Send for my SPECIAL BULLETIN

Includes complete achromatic microscopes of high power at $4.50, $12 50 and upwards.

Excellent Field Glasses

"BEAST AND BIRD SPECIAL"

with large clearly defining lenses, in black sole leather case with strap, sent prepaid for $5.50.

Edward Pennock

3603 Woodland Ave
PHILADELPHIA

ONE MAGAZINE IS INDISPENSABLE TO EVERY PERSON OF INTELLIGENCE

The "one magazine" is CURRENT LITERATURE, because it alone sweeps the whole field of human thought and action in both hemispheres.

It contains a monthly review of the world's news; quotations from and comments on the press of the world; numerous graphic cartoons and other illustrations; photographs and biographic sketches of the conspicuous personalities of the month; the most recent advances in science and discovery; the noteworthy events in religion, literature and art; critical reviews of the best fiction, dramatic and musical works; a page of the best humor and a condensation of the leading play of the month.

It gathers impartially from every field of human thought and activity those facts which are best worth knowing and gives the reader a clear, well defined and illuminating view of what the whole world is doing.

CURRENT LITERATURE, for one year $3.00 } Both for $3.25
FERN BULLETIN, for one year 75 cents }

ANOTHER COPY

We have obtained another copy of Williamson's "Ferns of Kentucky" which we offer for $4.50 postpaid. This volume, the first American fern book, compares very favorably with the most recent. It contains fifty-nine full page plates reproduced from etchings, and is the only fern book so illustrated. More than 150 pages of text give an account of the species. Valued highly for its unique position among fern books, and hard to get at any price, this copy will not remain on hand long. Order at once.

WILLARD N. CLUTE & CO., JOLIET, ILL.

Vol. XX No. 2

The Fern Bulletin

A Quarterly Devoted to Ferns

April

Smithsonian Institution
NOV 4 1912
National Museum

Joliet, Ill.
Willard N. Clute & Company
1912

The Fern Bulletin

A QUARTERLY DEVOTED TO FERNS

AWARDED GRAND PRIZE AT THE PARIS EXPOSITION

25 CENTS A COPY $1.00 A YEAR

WILLARD N. CLUTE, EDITOR

To insure subscribers against loss of one or more numbers between the expiration and renewal of their subscriptions the journal will be sent until ordered stopped. All arrearages must be paid. Remittances may be made by money order, stamps, currency or drafts and personal checks drawn on Chicago or New York. Checks on other banks must contain 10 cents for collection.

WILLARD N. CLUTE & COMPANY, PUBLISHERS, JOLIET, ILL.

Entered at the Post Office, Joliet, Ill., as second-class mail matter.

60 YEARS' EXPERIENCE

PATENTS

TRADE MARKS
DESIGNS
COPYRIGHTS &c.

Anyone sending a sketch and description may quickly ascertain our opinion free whether an invention is probably patentable. Communications strictly confidential. HANDBOOK on Patents sent free. Oldest agency for securing patents.

Patents taken through Munn & Co. receive *special notice*, without charge, in the

Scientific American.

A handsomely illustrated weekly. Largest circulation of any scientific journal. Terms, $3 a year; four months, $1. Sold by all newsdealers.

MUNN & Co. 361 Broadway, **New York**
Branch Office, 625 F St., Washington, D. C.

VOLUME VI
Out of Print

It is not likely that there will be any more "last appearances" of Volume VI. The best we can do now is to begin with volume VII. We offer the next 13 volumes (7-19) for $9.00 and will present to each purchaser a copy of 10 year index, Boston Meeting Papers and Ferns of Upper Susquehanna as well as 3 different numbers of Vol. VI. Single volumes 75 cents.

WILLARD N. CLUTE & CO.,
Joliet, Ill.

SOME SPECIAL OFFERS

THIS MAGAZINE ONE YEAR

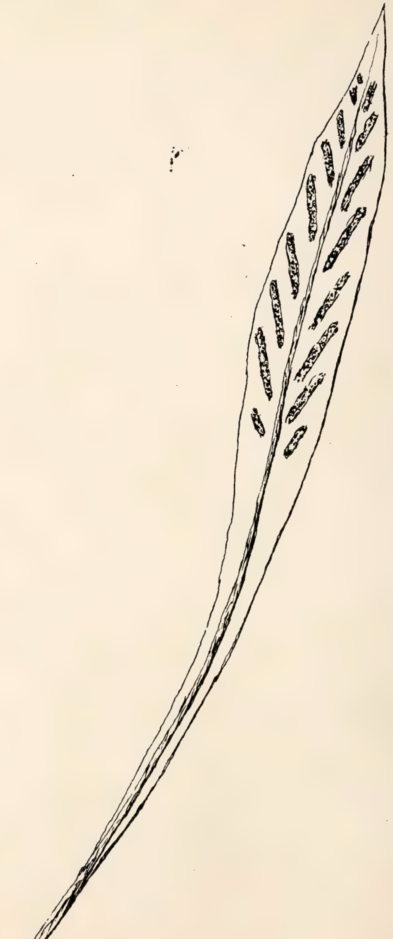
With any back volume later than Vol. 9	$1.25
With any two back volumes later than Vol. 9	1.60
With set of the Fern Bulletin (Vols. 7-18)	8.00
With the New Gray's Manual ($2.50)	3.00
With a Solid Steel Trowel, 8-in. blade, (40c)	1.00

With any Book or Magazine for 50c additional.

N. B.—Above prices are for subscriptions strictly in advance. Personal checks will not be accepted unless cost of collection is added.

Address all orders to

WILLARD N. CLUTE & CO.
JOLIET, ILLINOIS



GYMNOGRAMMA LANCEOLATA

THE FERN BULLETIN

Vol. XX APRIL, 1912 No. 2

THE FERN FLORA OF ILLINOIS.

By E. J. Hill.

The state of Illinois has an area of about 55,000 square miles. It lies between the parallels 37° and 42° 30′, thus giving a length of 5½° or about 380 miles. This north and south extension produces a milder climate in the southern part, but no fern of essentially southern distribution comes in except *Polypodium polypodioides*, though the two quill-worts of the state are perhaps better placed under this head also. It is the lowest of the north-central states in average altitude, the mean above sea level being about 600 feet, varying from 300 feet at the junction of the Ohio and Mississippi rivers to 1250 feet at the Wisconsin line in the extreme northwest part. As there is nothing in these extremes of elevation to effect material changes of temperature due to altitude, its floristic features are not much modified in respect of this. Anything of this character must be ascribed to local conditions, not general causes. Another factor that affects its floristic features is the dominance of prairie within its boundry, the forests and woodlands, sometimes very narrow strips, chiefly bordering its streams and lakes. Since lands covered with grass are not adapted to the growth of ferns, and consequently are limited in species, their number and variety must be much restricted for this reason. This must have been the case in the primitive condition of the prairies before they were so generally taken up for cultivation.

The loss in the original fern-flora is slight in this regard when compared with that of flowering plants. As nearly all of the state is in the region of the glacial drift, the soil is influenced by this condition also. The ravines cut in the drift and in the underlying rock where it is reached, with their varying degrees of moisture and shade, show the greatest variety in fern-life, though a greater abundance of certain kinds may be found in woods and swamps. The prevailing rocks are limestone, but sandstones occur in some localities, especially along the Illinois and Rock rivers. These in some parts of the state, particularly in the coal measures, the area of which is large, may be interstratified with shales and slate. These rocks and the soils resulting from their disintegration and decomposition, taken in connection with those of the glacial drift, provide a fair range of edaphic conditions for the growth of ferns. It is evident that such as prefer a calcareous soil will be best represented, if any preference of this kind inheres in their nature.

It will be seen from the list that not quite one half (56) of the Pteridophytes accorded specific rank in "Gray's New Manual of Botany" (115) are reported from this state. The genera are represented in larger proportion, 23 of the 31 given, or if *Athyrium* be separated, 24 of 32, or three-fourths of them. All the species of several of the smaller genera are found, up to three in the case of *Osmunda,* but all of none with species exceeding this number. The genus most fully represented is *Equisetum,* eight of the ten, or nine of eleven when *E. robustum* is given specific rank. To these must be added *E. Ferrissii,* not in the Manual.

Reliable data for the distribution of the ferns of the state are not very full. It is hoped that they may be made more complete by the co-operation of those into whose hands the list may fall. Many additions to the number of species can hardly be expected. Doubtless the state has been quite well explored in this respect. I find only two to add to those published by Patterson in 1876, *Isoetes Butleri,* described in 1878 from specimens found in Indian Territory (Oklahoma) but since found in this state, and *Equisetum Ferrissii,* a recent addition. The list is mainly a compilation made at the request of the editor of the *Fern Bulletin.* No special fitness for the task is claimed, since my personal knowledge of the region covered is almost wholly confined to five of the northeastern counties, Kankakee, Will, Cook, Dupage and Lake. Only casual trips of slight duration have been made to other places. The publication most relied on for the state at large is the "Catalogue of the Phaenogamous and vascular cryptogamous plants of Illinois," H. N. Patterson, Oquauka, Ill., 1876. His catalogue of plants growing in the immediate vicinity of Oquauka has also been used. Friedrich Brendel's "Flora Peoriana, Budapest, 1882," (the German edition, but since given in English, I believe) has furnished some definite information for a district around the city of Peoria. The floras of H. H. Babcock and of Higley and Raddin for Chicago and vicinity have likewise been consulted, but as they respect territory mainly familiar to the writer, could be cited but little.

As explantory of the plan followed I may state that I have first mentioned the localities or stations with which I am personally acquainted, and from which examples are in my herbarium unless very common throughout. Citations from Patterson's catalogue for the state at large are entered in quotation marks followed by (P.). Where Peoria is given the authority is Brendel, where Oquauka, Patterson. A few have been furnished by V. H. Chase, who collected in Stark county and vicinity, and by Prof. Atwell of the Northwestern University, from data in the herbarium of the University.

OPHIOGLOSSACEAE.

Ophioglossum vulgatum (L.) "Wabash county, a single plant." *Schneck.*" (P.) Probably elsewhere, but easily overlooked.

Botrychium obliquum (Muhl.) In open woods, Cook Co., rare. "S. Illinois. *Vasey, Sehneck.*" (P.) Peoria Co., *V. H. Chase.* Starved Rock. *J. H. Ferriss.*

Botrychium obliquum dissectum. (Spreng.) Peoria Co., *V. H. Chase.*

Botrychium virginianum. (L.) Common in rich woods in the northeastern part of the state, and probably throughout. It often occurs in colonies, sometimes of a dozen or more plants. In woods along Lake Michigan it reaches a height of two feet.

OSMUNDACEAE.

Osmunda cinnamomea. (L.) Abundant in swampy areas in the northesatern counties, especially in peaty ground near Lake Michigan within the limits of the ancient glacial Lake Chicago. Swampy areas in sand barrens west of Kankakee, "Menard county. *Hall.*" (P.) Starved Rock. *Clute.*

Osmunda Claytoniana (L.) Frequent in swamps and wet woods from Kankakee county north in the eastern part of the state. Peoria, *Brendel.* Henderson Co., *Patterson.* "Moist ravines, common," says Patterson for the state at large.

Osmunda regalis (L.) Has a range similar to the last and is quite frequent northeast in swamps and wet woods. Peoria, *Brendel.* Mason county, *Bebb.* Infrequent says Patterson for the state as a whole.

POLYPODIACEAE.

ADIANTUM PEDATUM (L.) Common throughout the state in rich woods.

POLYPODIUM VULGARE (L.) On cliffs of sandstone, La Salle and Ogle counties. "Common in Jackson and Union, *French, Forbes.*" (P.)

POLYPODIUM POLYPODIOIDES (L.) Common throughout the state in rich woods.

PTERIS AQUILINA (L.) Copses and borders of dry woods. Frequent, or abundant in localities northeast. Starved Rock, LaSalle county, Peoria, *Brendel,* Henderson, *Patterson,* Shelby, *Mary Evertz.* "Common." for the state. (P.) Rare in Will county in the prairie region. *Clute.*

CHEILANTHES LANOSA (Michx.) "Rocks, St. Clair county, *Brendel,* and southward." (P.)

CHILANTHES FEEI (Moore.) Limestone cliffs by Mississippi river, Carroll county, "near Galena, *Brendel;* Pike county, *Mead;* Jackson, *French.*" (P.)

PELLAEA ATROPURPUREA (L.) Frequent on cliffs of limestone along the Desplaines river and its tributaries from Sag Bridge, Cook county, to Joliet, Will county, and in Kankaee and Carroll counties. Scarce on cliffs of sandstone, Oregon, Ogle county. Henderson county, *Patterson;* Kane county, *W. J. Minium;* Wedron, LaSalle county, *Ferriss.* Reported for the state as general but "infrequent" in Patterson's catalogue.

PELLAEA GRACILIS (Michx.) Rare in thin soil in shelves of shaded and usually moist calcareous rocks. Sag Bridge and Lemont, Cook county, and Bounbonnais, Kankakee county. On moist sandstone rocks, Liberty Hill, Oregon, Ogle county; limestone, Aurora, Kane county; sandstone, Sheridan, LaSalle county, *Ferriss.*

Asplenium angustifolium (Michx.) Henderson, *Patterson,* Peoria, *Brendel* "Rich woods, scarce for the state." (P.) Joliet rare, Starved Rock more common, *Ferriss.*

Asplenium pinnatifidum (Nutt.) "On rocks, Jackson and Union counties, *French*; Pope, *Schneck.*" (P.)

Asplenium platyneuron (L.) "Open rocky woods, scarce." (P.)

Asplenium ebenoides (R. R. Scott.) Reported from Jackson county, Ill., but without further reference in *Fern Bulletin,* vol. V., p. 13.

Asplenium Trichomanes (L.) "On shaded rocks, Jackson and Union counties, *French;* Wabash, *Schneck.*" (P.) Southern Illinois. *Vasey.* Starved Rock, two plants. *Ferriss.*

Athyrium filix-foemina (L.) Frequent in rich, moist woods in Cook and adjoining counties, as well as throughout the state as given by *Patterson,* Peoria, *Brendel;* Jackson, *Saml. Bartley;* Henderson, *Patterson;* Ravinia, Willow Springs, Cook county, *Prince.*

Athyrium thelypteroides (Michx.) "Near Glencoe, Cook county," *Higley and Raddin;* "Peoria and Fulton counties, *Brendel* and *Wolff;* Wabash, *Schneck.*" (P.) Joliet, rare; Starved Rock abundant, *Ferriss.*

Camptosorus rhyzophyllus (L.) On outcrops of limestone in the Desplaines valley in Cook and Will counties from Sag Bridge to Joliet. Abundant at Dellwood Park and in one locality at Sag Bridge, infrequent elsewhere. "Shaded rocks throughout but scarce." (P.) Jo Daviess county, *Pepoon.*

PHEGOPTERIS HEXAGONOPTERA (Michx.) "Rich open woods and shaded ravines, chiefly in the northern portion of Cook county; infrequent." *Higley* and *Raddin* (1891.) Peoria, *Brendel;* Henderson, *Patterson;* Jackson, *Bartley;* Joliet and Starved Rock, *Ferriss.* Patterson reports "frequent" throughout.

PHEGOPTERIS POLYPODIOIDES (Fée.) Starved Rock, La Salle county, "Menard county, *Hall.*" (P.)

NEPHRODIUM NOVEBORACENSE (L.) "Elgin, Kane county, *Vasey;* Wabash, *Schneck,* Swamps, scarce." (P.)

NEPHRODIUM THELYPTERIS (L.) Frequent or often abundant in swampy, wooded ground or open marshes, in Cook, Lake, Dupage, Will and Kankakee counties, Peoria, *Brandel;* Starved Rock, *Clute.* Frequent throughout the state according to Patterson.

NEPHRODIUM CRISTATUM (Michx.) Starved Rock, rare, *Ferriss.*

NEPHRODIUM GOLDIEANUM (Hook.) "Rich Woods, Peoria and Fulton counties, *Brendel, Wolff;* Makanda, Jackson county, *Forbes,*" (P.) Will county, La Salle county, *Ferriss.*

NEPHRODIUM MARGINALE (L.) Rocky bluffs, Starved Rock, La Salle county, Southern Illinois, *Vasey.* "Scarce" for the state. (P.)

NEPHRODIUM SPINULOSUM INTERMEDIUM (Muhl.) Frequent in rich woods in the northeastern counties, Starved Rock, *Clute.* Patterson says "infrequent" for the state.

POLYSTICHUM ACROSTICHOIDES (Michx.) Will county, "north part of Cook county," *Higley* and *Raddin;* Henderson, *Patterson;* Peoria, *Brendel;* Jackson, *Bartley*. For the state, "infrequent." (P.) The variety *incisum* is occasionally reported.

CYSTOPTERIS BULBIFERA (L.) Frequent on shelves and in crevices of limestone cliffs and shady ravines in the Desplaines valley in Cook and Will counties, and in Kankakee county, Henderson, *Patterson*, Peoria, *Bredel;* Starved Rock, abundant, *Clute*. Patterson reports for the state, "shaded rocks, frequent."

CYSTOPTERIS FRAGILIS (L.) Rather frequent in rich woods and occasionally on rocks in Cook, Lake, Dupage, Will and Kankakee counties; Henderson, *Patterson;* Peoria, *Brendel;* Jackson, *Bartley*. "Common" for the state. (P.) Very variable in its forms.

WOODSIA OBTUSA (Spreng.) Scarce on limestone rocks at Lemont, Cook county, abundant on sandstone at Oregon, Ogle county, "Marion county, *Bebb;* Wabash, *Schneck;* and southward." (P.) Joliet, Will county, *Ferriss*.

WOODSIA ILVENSIS (L.) "On sandstone cliffs near Oregon, Ogle county, *Bebb*." (P.)

ONOCLEA SENSIBILIS (L.) Common in wet woods and swamps in the northeastern counties. Peoria, *Brendel;* Jackson, *Bartley*. For the state "common." (P.)

ONOCLEA STRUTHIOPTERIS (L.) Wet shades, Starved Rock, La Salle county, Henderson, *Patterson;* Peoria, *Brendel*; Fulton, *Wolff*. For the state "infrequent." (P.)

DICKSONIA PUNCTILOBULA (Michx.) "Wabash county, *Schneck*." (P.)

SALVINIACEAE.

Azolla caroliniana (Willd.) "Ponds from Henderson and Peoria counties southward. Infrequent." (P.) "Since 1857 not found again in the region of our local flora." *Brendel* in Flora Peoriana. "In a pond near South Chicago, 1886. So far as known this is the only locality where this species has been found within our limits." *Higley* and *Raddin.*

EQUISETACEAE.

Equisetum arvense (L.) Common from Kankakee county north. Reported by Patterson as common throughout the state. Though usually growing in moist sand or gravel, it is often found in the Chicago region in masses along dry railway embankments.

Equisetum palustre (L.) "Wet places, Peoria county, *Wolff, Brendel.*" (P.)

Equisetum fluviatile (L.) In shallow water or very wet ground. Quite frequent about Chicago. "Cass county, *Mead;* Peoria, *Brendel;* McHenry, *Vasey.* Scarce." (P.) Joliet, common, *Ferriss.*

Equisetum laevigatum (A. Br.) Cook and Kankakee counties." "In dry or moist clay or sand from Henderson and Peoria counties southward." (P.) In the Chicago region generally in moist sands; Hancock county, *Mead.*

Equisetum hyemale (L.) Moist places, Cook, Will and Lake counties. Frequent, as well as throughout the state according to Patterson.

Equisetum Ferrissii, (Clute.) Moist banks, Will county.

Equisetum robustum (A. Br.) On moist or wet banks of streams. Thornton and La Grange, Cook county. "River banks from Peoria county southward." (P.)

Equisetum variegatum (Schleich.) In clayey ravines at Lake Forest and in wet sands at Waukegan, Lake county, Peoria, *Brendel*. Var. *Jesupi,* A. A. Eaton, and var. *Nelsoni,* A. A. Eaton, are credited to Illinois in Gray's New Manual of Botany. The latter variety occurs in Lake county, Ind., bordering Illinois, and is likely to be found in the neighboring parts of this state, but those from Lake county, Ill., agree better with the typical form.

Equisetum scirpoides (Michx.) Moist shaded ravines, Lake Bluff, Lake county. Reported by *Cowles* at Lake Forest. "Ringwood, McHenry county, *Vasey*." (P.)

LYCOPODIACEAE.

Lycopodium inundatum (L.) "Moist sands, south Evanston, Cook county." *Higley* and *Raddin.*

Lycopodium lucidulum (Michx.) "Moist woods, Evanston, Cook county, *Vasey;* Ogle, *Bebb.*" (P.)

Lycopodium selago (L.) "Collected by J. W. Powell near Ottawa, *Vasey*." (P.)

SALAGINELLACEAE.

Selaginella rupestris (L.) Dry sands and sandstone rocks, La Salle and Ogle counties. "Dry rocks and barrens, Henderson county; Ogle. *Bebb,* Rare, or overlooked." (P.)

Selaginella apus (L.) Low sandy, peaty, or springy ground, Kankakee, Cook, Lake and Will counties. Peoria, *Brandel;* Lawns in Joliet, *Miss L. M. Hird.* "Low sandy places," says Patterson, as if throughout the state.

ISOETACEAE.

ISOETES MELANOPODA (J. Gay.) "Muddy borders of a pond near Hyde Park water-works, 1885. Wet prairies near Grand Crossing, 1886-87." *Higley* and *Raddin*. These stations in Cook county are doubtless destroyed now. Stark county, *V. H. Chase*. "Menard, *Hall;* Fulton, *Wolff;* McHenry, *Vasey*." (P.)

ISOETES BUTLERI (Engelm.) "Moist hillsides and shallow depressions, Illinois and Kansas to Tennessee and Oklahoma." Gray's New Manual of Botany.

A PROBLEMATICAL FERN.

(*Gymnogramma lanceolata*.)

BY WILLARD N. CLUTE.

In the identification of fern species one occasionally comes upon two forms so nearly alike that it requires very careful study to decide whether they are two different species or merely two forms of a single variable species, but it is rare that one finds a fern that can as well be placed in one genus as another, and still more rare when the species possesses characters so like those of ferns in other groups that it may be moved from one tribe to another without violating any of the botanical properties. The fern chosen for illustration here is one of this latter character. It has been passed back and forth between various genera in different tribes, seldom resting long in one place, until it is a very problematical species indeed.

In outline and manner of growth it possesses no especial peculiarities. The lanceolate leaves might fit any of a dozen or more species that might be mistaken for it if the fruit dots or sori were absent. *Vittaria*, *Tae-*

mitis, Antrophyum, Polypodium, Asplenium, Acrostichum and many other genera have species with leaf outlines that almost exactly match it, but a glance at the fruiting fronds, at once excludes many of these genera as possible harbors for the species and at the same time increases the difficulties of finally placing it. The sori are apparently linear and *Scolopendrium* or *Asplenium* comes to mind, but there is no indusium and so the relationship is thrown into that group of ferns clustering about such forms as *Gymnogramma.*

In fact, our fern was for a long time known as *Gymnogramma lanceolata* and owing to this fact I have selected this to stand as the name of the plant. A glance at the illustration, however, will disclose a frond not at all like the conventional *Gymnogramma* frond, but it is as much like a *Gymnogramma* as it is like the family to which the plant is now assigned. Curious as it may seem this plant with elongated sori oblique to the midrib is now regarded as a *Polypodium!* Before its settling down in this genus, it had been placed in *Antrophyum, Grammitis, Loxogramme* and *Selliguea* as well as *Gymnogramma.* This is by no means due to the variable nature of the fern. Through all these vicissitudes it has remained unchanged. The fluctuations from one genius to another even from one tribe to a different one, have been due to the varying opinions of mere man and his efforts to fit the fern to a set of descriptions of his own making. Circumstances such as these are quite sufficient to justify the refusal to accept off-hand the results of every "revision" which ambitious systematists see fit to inflict upon us.

While reposing in the genus *Gymnogramma,* the fern was well-known to be somewhat unorthodox. In every large assemblage of species there are, in addition to those which are typical, certain others that diverge somewhat, but not enough to form a separate genus. Thus our plant was placed in the section *Selliguea.* Sometimes, indeed, *Selliguea* was isolated as a separate genus, but usually accompanied by the statement that if it were not for the shape of the sorus it would make a good addition to the section *Phymatodes* of *Polypodium.* Here, at least, is where it has landed, the elongated sori being winked at, possibly, or perhaps the species makers are willing to assume each so-called sorus to be a series of *Polypodium* sori. In this age, however, there are those who deny to the species in the group *Phymatodes* the right to be included in *Polypodium* and in certain books our species appears as *Phymatodes loxogramma.* Just how this *loxogramme* came to supplant *lanceolata* is another story, not to be detailed here. Suffice to say that the new name was picked up during one of the fern's numerous transfers.

As to *Phymatodes,* it is likely that the species in this group are distinct enough to form a genus by themselves but it would be a rash student to encourage such a departure, for once started we should soon see all the large genera cut up into lesser groups and then what delightful times the name-tinker would have!

By what ever name called, the species manages to thrive over a wide stretch of country in the Eastern Hemisphere, being found from Japan and China to the Himalyas, Ceylon and the Guinea Coast and represented in many of the islands of the Pacific including Fiji and Samoa. The specimen from which the illustration was made was collected by K. Miyake near Kyoto, Japan where it is reported "not so common."

THE TALL SPLEENWORTS.

By Adella Prescott.

Some years ago when for me there were but two species of ferns, those that were finely cut and those that were not—and maidenhair—I supposed of course that the narrow leaved spleenwort (*Asplenium angustifolium*) was simply a hardy sword fern and that both were varieties of the Christmas fern! But when I began to read the fascinating pages of Clute and Parsons and Waters I found, even in the early summer, that there were differences and by the time the sori appeared I was wise enough to recognize the characteristic mark of the spleenworts. Even then I thought it but a common fern for in the woods with which I was most familiar it grew plentifully and it was not till sometime later that I learned that it is at least rare enough to insure for itself a welcome whenever found.

It is an extremely local plant and may be looked for perhaps for years before being found though it has a wide distribution and is apt to be plentiful where it grows at all. It prefers rather moist soil and seems to like Goldie's fern for a neighbor as I have often found them in close proximity.

The fronds grow in tufts from a creeping rootstock and are said to reach a height of four feet but all that I have seen were shorter by at least a foot. The blades are simply pinnate with many long, narrow pinnules tapering to slender tips. The fertile fronds are taller with the pinnules much narrower and the linear sori borne in two rows along the midrib of each pinnule. The fronds are delicate in texture and are easily destroyed by summer storms, yet the plant is able to adapt itself in some degree to its environment for a plant that I have in a border where it is exposed to cold winds has become much more rugged both in appearance and in fact. It is a charming addition to the fern garden making a pleasing foil to *Nephrodium spinulosum*, *Dicksonia* and other finely cut varieties.

I think it is a pity that the silvery spleenwort has no common name but one that is suggestive of a varied assortment of "blues," and that does not certainly belong to it at that. But when we consider the discomforts suggested by the word "spleeny" we may think after all that this plain unassuming plant would prefer to be classed among the spleenworts with their fabled powers of healing rather than among the gentle folk of the *Athyriums* where perhaps it rightly belongs.

The silvery spleenwort, *Asplenium thelypteroides*, or *Athyrium thelypteroides* as some prefer to call it, has few characteristics that would make it noticeable among other species. It is of an ordinary size, from two to three feet in height, and the fronds are produced singly from a stout creeping rootstock but they grow so close together as to suggest a circular crown. They are once pinnate with deeply lobed pinnules and have rather a soft velvety texture though quite thin and delicate. The blade is oblong, tapering both ways from the middle and there is little difference between the fertile and sterile fronds.

The sori are borne in regular double rows on the pinnules and while in general they are like those of the spleenwort yet they are frequently curved after the fashion of the lady fern, making a puzzling question on which the botanical doctors fail to agree.

This species is fairly common over a wide area and while not possessing any striking beauty is interesting and attractive to the true lover of ferns.

New Hartford, N. Y.

FURTHER NOTES ON VARIATION IN BOTRYCHIUM RAMOSUM.

BY RAYNAL DODGE.

On June 2nd of the present year I again visited the Botrychium stations at Horse Hill, Kensington, N. H., and at Newfound Hill in Hampton Falls. A description of these was given in *The Fern Bulletin* April 1910. I found that a great change had taken place since my last visit in 1907. The young trees had grown wonderfully and shaded the station, the farm house had been abandoned, the hens had disappeared, and *Botrychium ramosum* had again taken its place at the foot of the hill. But instead of the many thousands which formerly grew there, I only succeeded in finding about forty plants, some of them however, quite robust and well grown. On the same day, in company with a friend, I made a thorough search for *Botrychium simplex* at Newfound Hill but failed to find a single plant.

It appears that all the forms in the genus *Botrychium* increase in numbers very slowly and that the individual plants require many years to attain their full development, but if the station for *Botrychium ramosum* on Horse Hill escapes damage by fire or marauding hens I think that within twenty years someone perhaps now younger than I, may find a large colony of *Botrychium simplex* at the old station on Newfound Hill. Several of my young friends have undertaken if possible to make a search.

Perhaps some of the readers of *The Fern Bulletin* know of localities where *Botrychium ramosum* and *B. simplex* are to be found growing near each other. If any such are known it seems that further investigations relating to this subject might be made. Or perhaps it would be enlightening of spores of *B. ramosum* in sufficient quantity were to be sown on some dry hillside that was easily accessible to the experimenter. Immediate results however should not be expected as these *Botrychiums* move very slowly, according to some experimenters requiring several years before germination of the spores. Moreover in the present case the continued growth of the young plants would be very much dependent on the amount of moisture they might receive as is evidenced by the total destruction of the plants at Newfound Hill by a very severe drouth.

Since speaking on this subject before the members of the American Fern Society I have been informed of two other instances besides those at that time mentioned where plants of *B. simplex* once found had disappeared which seems further evidence that the form *simplex* in *Botrychium* described by Hitchcock as growing in dry hills is not self-perpetuating.

Newburyport, Mass.

[To the instances of the disappearance of *B. simplex,* may now be added the disappearance of the colony found at Glen Park, Indiana in 1910. In that year there was perhaps a hundred plants found. Every year since, members of the Joliet Botanical Club and others have searched for them but not a single specimen has been discovered. Some *Botrychiums* have the habit of resting for a year or more, but it hardly seems likely that they would rest for three summers in succession.—*Ed.*]

RARE FORMS OF FERNWORTS—XXII.

Still Another Christmas Fern.

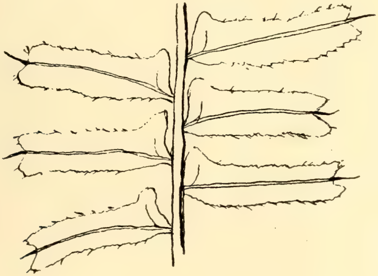
In 1893, the late James A. Graves found a curious form of Christmas fern (*Polystichum acrostichoides*) in the vicinity of Susquehanna, Pa., and removed it to his garden where it continued to put forth its abnormal fronds for many years and may still be alive for anything the writer knows to the contrary. During the period in which Mr. Graves gave his principal attention to the study of ferns he was often advised to describe his abnormal specimen, but he was always so much engrossed in the study and cultivation of the living ferns that he never found time to write a formal scientific description of the plant, though he had settled on a name for it. The form undoubtedly deserves a distinctive name and since the discoverer is no longer with us, it seems very fitting that the form be named for him. I therefore offer the following description of

POLYSTICHUM ACROSTICHOIDES f. GRAVESII.

Plant similar to the type but with the pinnae ending in truncate tips from which the midveins project as spinelike bristles. Type in the herbarium of Willard N. Clute. Cotype in the herbarium of Alfred Twining, Scranton, Pa,

Although the description is drawn from a single plant it is likely that a search in the regions where the Christmas fern is aboundant would reveal other specimens with the same peculiarity. Indeed, H. G. Rugg in a paper before the Vermont Botanical Club, last winter, described a plant that, to judge from his remarks must be essentially the same thing. He says: "For several years I have had a peculiar form of this fern growing in my garden. It is interesting because of the truncate form of the pinnae and the multifid form of the tip of the frond. The sterile fronds are usually like those of the type plant. This fern I transplanted into my garden several years ago and ever since then it has continued to bear these peculiar fronds. The late Mr. B. D. Gilbert was interested in the plant and asked permission to describe it in the *Fern Bulletin* but illness and finally death prevented." Apparently the only difference between the Vermont and Pennsylvania plants is the cristate apex, but as forking tips are to be expected in any species this feature is not extraordinary.

Mr. Graves usually spoke of his specimen as the variety *truncatum*. This is the name it bears in some herbaria and is the one it undoubtedly would have borne in literature had he lived to describe it. Those who were fortunate enough to have known Mr. Graves personally, however, will be pleased to see his name associated with one of the forms of that division of the plant world which he studied so long and so assiduously. It need hardly be said for the readers of this magazine that Mr. Graves was one of the founders of the Linnaean Fern Chapter the name by which the American Fern Society was originally known, was elected the first treasurer and held that office through half the lifetime of the society, was one time president of the same society and for a long time one of the most resourceful of its Advisory Council members.



The drawing herewith was made from the middle pinnae of a frond kindly supplied by Mr. Alfred

Twining, of Scranton, Pa. It is a fair average of the form and though without much beauty of outline is still of interest for the form in which nature has cast it.

NOTES ON VARIOUS FERNS.

By S. Fred Prince.

I was very much interested in Mr. Hill's article on the cliff brakes in the January Bulletin. I lived at Madison, Wisconsin, from 1874 to 1878, and have gathered *Pellaea atropurpurea* many times from the sandstone cliffs, not only on Lake Mendota, but also Lake Monona and outcrops in other parts of the "Four-lake County."

I found it growing on both the Potsdam and the Madison sandstones. On the former it was only in small clumps, or isolated plants, much more sparse in growth than when on the latter, though I never found it anywhere in such dense, tangled masses as it forms in the clefts of the limestone rocks of the southwest Ozarks.

I have also found *Pellaea atropurpurea* growing thinly, on a dark red sandstone, at Paris Springs, Missouri, not far from Springfield.

I would like to add to the localities of *Polypodium vulgare* in Michigan. I found it, in the summer of 1910, growing in dense mats on sand dunes, south of Macatawa, Michigan. The plants were in a woodland composed principally of hemlock, with oak and a general mixture of elm, maple, hickory, etc. When you lifted a mat of the fern, the bare sand was left exposed. I thought the conditions rather peculiar.

I found many ferns growing on these wooded sand hills where, at the most, there was but half an inch of soil on top of the white sand. The list includes:

Adiantum pedatum; Pteris aquilina; Asplenium filix-foemina, in marshy places between the dunes; *Polystichum acrostichoides,* very sparingly; *Nephrodium thelypteris,* very luxuriant, like the lady fern, in marshy ground; *Nephrodium marginale,* the most common fern; *Nephrodium cristatum; Nephrodium spinulosum,* wherever there was a rotting chunk of wood; *Onoclea sensibilis,* and *Onoclea struthiopteris,* both very rank; *Osmunda regalis* and *Osmunda cinnamomea,* these last four in marshy spots; and *Botrychium virginianum,* on the sides of the dunes.

I have been observing the habits of *Onoclea sensibilis* for many years, even raising plants from the spores to five years old; caring for other plants for years, changing conditions, and varying my experiments, until I have come to the following conclusions:

When the soil is constantly and evenly moist and unusually rich, and the plant is constantly shaded, it tends to produce its fertile fronds flattened out like the sterile, with all stages to those only partly rolled up. These *unrolled* fertile fronds do not differ from the *rolled up* ones, on the same plant, except in this one particular.

When a heavy screen was changed so that the plants would be in the full light and sun, the fertile fronds produced the rest of the season were as tightly rolled as usual, and it took two years of shading before these plants produced open or unrolled fertile fronds again. Varying the other conditions—moisture and nutriment, had similar results, but less marked.

Champaign, Ill.

SCHIZAEA PUSILLA AT HOME.

Anyone who has seen this odd fern growing in its native haunts will probably concur in the opinion held by some, that while it is looked upon as one of the rarest of ferns its small size and its habit of growing in the midst of other low plants have no doubt caused it to be passed over by collectors in many regions where it really exists. This should be an encouragement to collectors to keep the fern in mind in their field excursions with a view to adding new stations for it to those now known. The finding of a rare plant in a new locality is always a source of especial pleasure to the discoverer, aside from being an item of value to the botanist in general.

Schizaea pusilla was first collected early in this century at Quaker Bridge, N. J. about thirty-five miles east of Philadelphia. The spot is a desolate looking place in the wildest of the "pine barrens" where a branch of the Atsion river flows through marshy lowlands and cedar swamps. Here amid sedge grasses, mosses, *Lycopodiums*, *Droseras* and wild cranberry vines the little treasure has been collected. But though I have hunted for it more than once my eyes have never been sharp enough to detect its fronds in this locality.

In October of last year, however, a good friend guided me to another place in New Jersey where he knew it to be growing and there we found it. It was a small open spot in the pine barrens, low and damp. In the white sand grew patches of low grasses, mosses, *Lycopodium Carolinianum*, *L. inundatum* and *Pyxidanthera barbata,* besides several small ericaceous plants and some larger shrubs, such as scrub oaks, sumacs etc. Close by was a little stream and just beyond that a bog. Although we knew that *Schizaea* grew within a few feet of the path in which we stood, it required the closest kind of a search, with eyes at the level of our knees before a specimen was detected. The sterile fronds, curled like corkscrews, grew in little tufts and were more readily visible than the fertile spikes which were less numerous and together with the slender stipes were of a brown color hardly distinguishable from the capsules of the mosses and the maturing stems of the grasses which grew all about. Lying flat upon the earth with face within a few inches of the ground was found the most satisfactory plan of search. Down there all the individual plants looked bigger and a sidelong glance brought the fertile clusters more prominently into view. When the sight got accustomed to the miniature jungle, quite a number of specimens were found but the fern could hardly be said to be plentiful and all that we gathered were within a radius of a couple of yards.

This seems, indeed to be one of the plants whose whereabouts are oftenest revealed by what we are wont to term a "happy accident" as for instance, when we are lying stretched on the ground, resting, or as we stoop, at lunch, to crack an egg on the toe of our shoe. I know of one excellent collector who spent a whole day looking for it diligently in what he thought to be a likely spot but without success when finally, just before the time for return came, as he was half crouching on the ground, scarcely thinking now of *Schizaea,* its fronds suddenly flashed upon his sight, right at his feet.

The sterile fronds of *Schizaea pusilla* are evergreen so the collector may perhaps best detect it in winter selecting days for his search when the ground is pretty clear of snow. The surrounding vegetation being at that time dead the little corkscrew-like fronds stand out more prominently. The fertile fronds die before winter sets in but their brown stalks frequently nevertheless remain standing long after.—*C. F. Saunders in Linnaean Fern Bulletin, Vol. 4.*

PTERIDOGRAPHIA.

A New Fern Pest.—According to the *British Fern Gazette* a new pest threatens the specimens of those who collect living plants. This is the larva of a small weevil which gets into the stipes of the ferns and burrowing downward into the heart of the rhizomes soon cause the death of the plant. The weevil is of Australian origin, probably introduced into Britain with imported plants. Its scientific cognomen is *Syagrius intrudens.* At first its depredations were confined to ferns under glass, but more recently it has taken to the ferns in the wild state. This, however, is not the only enemy of the ferns that British growers have to contend with. Another small beetle known as the vine weevil (*Otiorhyncus sulcatus*) is fond of the plants both in the adult and larval stages, but the newcomer has already developed a reputation for destructiveness that places it first as a fern pest.

Walking Fern and Lime.—Nearly everybody who cultivates the walking fern (*Camptosorus rhizophyllus*), thinks it necessary to supply it with a quantity of old mortar, quick-lime or pieces of limestone under the impression that the fern cannot live, or at least cannot thrive without a considerable amount of calcium in the soil. As a matter of fact it has been reported on sandstone, shale, gneiss and granite and may possibly grow on others. Its noticed preference for limestone is apparently not due to its dependence on calcium but rather to the fact that it is more nearly adjusted to the plant covering of limestone rocks than it is to others. It will grow in any good garden soil, but in such situations it must be protected from its enemies, the ordinary weeds of cultivation, which otherwise would soon run it out. The same thing is true of many plants besides ferns. The cactus plant that cheerfully endures the intense insolation and frequent drouth of the sand barrens, succumbs very soon to the grass and weeds when planted in rich soil.

Stipe or Stipes.—When it comes to the designation of the stalk of a fern leaf, there is a wide difference in the way British and Americans regard it. Americans invariably speak of a single stalk as a stipe and they may be somewhat astonished, upon referring to a dictionary, to find that while stipe us given as a legitimate word, it comes direct from the latin *Stipes* which the Britons, with perhaps a more classical education, are accustomed to use. In America the plural of stipes is stipes or, rather, the plural of stipe is stipes; but in England the plural of both stipe and stipes is *stipites.* In certain uncultivated parts of our own country the singular form of the word species is given as specie; but when we smile at some countryman's description of a specie of fern, our merriment may be somewhat tempered by the thought that we still say stipe instead of stipes. If we could only believe that we use stipe with full knowledge of its derivation, it would not seem so bad, but it is very evidently a case of plain ignorance.

Apogamy in Pellaea.—Apogamy, or the production of a new sporophyte from the gametophyte without the union of egg and sperm, used to be considered a rather rare phenomenon, but as more study is given the matter, it begins to seem fairly common. Several years ago Woronin reported apogamy in *Pellaea* *flavens, P. niveus* and *P. tenera* and still more recently W. N. Steil of the University of Wisconsin reported the same condition in our native *Pellaea atropurpurea.* In Steil's specimens the young sporophytes were borne on the prothallus lobes near the notch. The same investigator is now working on apogamy in other species. A note in a recent number of this magazine asked for spores of *Pellaea gracilis* (*Cryptogramma Stelleri*) for this purpose.

LYCOPODIUM LUCIDULUM POROPHYLUM.—In the *Ohio Naturalist* for April Prof. J. H. Schaffner devotes several pages to a discussion of the specific distinctness of forms allied to *Lycopodium lucidulum* and comes to the conclusion that *Lycopodium porophylum* is a good species. If one is to judge by appearances alone, there can be no question as to *L. lucidulum* being different from *L. porophylum* but if the different appearances that plants put on under different conditions of warmth, light and moisture are to be considered then there as a number of fern species in this country in need of a name. Compare *Woodsia obtusa* grown on a sunny cliff with the same species grown on a moist one, or *Equisetum arvense* in woods and on railway banks. Nobody at present can say positively whether the form called *porophyllum* is a species or not. If it can be grown in moisture and shade while still retaining its characters, or if its spores will produce plants like the parent when sown in moist shades, then the case should be considered closed. Meanwhile, if one were to imagine a dry ground form of *L. lucidulum* what kind of a plant would he construct? Perhaps prostrate stem shorter; branches in a denser tuft, shorter; leaves less notched, smaller; whole plant yellower. Well, that is the description of *L. porophylum!*

Affinities of Taenitis.—The genus *Taenitis* is one that has always puzzled botanists. It was once placed in the tribe Grammitideae along with such genera as *Notholaena, Brainera, Meniscum, Vittaria, Hemionitis* and *Drymoglossum,* and it has also been considered sufficiently distinct to stand as the type of a tribe named for it, while recently it has been considered as a member of the tribe *Polypodieae.* Now comes E. B. Copeland in the *Philippine Journal of Science* and gives the genus another turn and this time places it in the Davallieae largely upon the relationship shown by the internal structure of the stem and the character of the scaly covering. It is likely that the new manipulator of the genus is as near right as anybody. The main thing is to discover what are the real indications of relationships. With some students it is venation, with others the shape and position of the indusium, with others the character of the vestiture and still others may have other rules by which to judge. When we agree upon the proper earmarks, anybody ought to be able to put the ferns in their proper groups.

Sporophyll Zones.—The fact is well known that some of the club-mosses, notably the shining club moss (*Lycopodium lucidulum*) and the fir club-moss (*L. Selago*), bear their sporangia in bands or zones that alternate with regions on the stem in which there are no sporophylls, but it does not seem to be equally well recognized that the same phenomena are found pretty generally among the ferns. If one will examine the crowns of the cinnamon fern, it will be readily seen that sporophylls and vegetative leaves form alternating circles. Curiously enough, the fertile fronds, which appear at maturity within the circle of sterile leaves, really belong to the outer circle, as befits the group that is to develop first. The sensitive and ostrich ferns are other species in which the zones of fronds are very distinct. So pronounced is this, and so far has each kind developed before unfolding, that each is usually incapable of taking up the functions of the other in cases where the destruction of one kind makes such exchange necessary or desirable. From efforts on the part of the plant to supply vegetative tissue to leaves designed originally for spore-bearing, only, we owe the various "obtusilobata" forms occasionally reported. The differences in zonation here mentioned are most pronounced in ferns with dimorphic fronds, but evidences of the same thing, more or less distinct may be found even in those ferns that have the fertile and sterile fronds essentially alike in outline. As a usual thing, the spore-bearing leaves are produced after the vegetative leaves have unfolded and when we find a plant in full fruit in late summer, that lacked spores in spring, it is due to the developing of the fertile leaves later. This is especially true and most noticeable in ferns that produce their fronds in crowns, but even in those species with running rootstocks, we commonly find evidences of zonation. Following out the idea of zonation we find among many of the fern allies that not only are the sporophylls assembled in zones but the zones terminate the central axis or branch. Under such circumstances the shoot begins to take on many of the characteristics of the flower and if we allow the definition of a flower as a shoot beset with sporophylls, it really is a flower. In the plants in which the flower comes to its highest development this structure is essentially a group of two kinds of sporophylls set round with sterile leaves called petals and sepals. Did ferns, instead of selaginellas, produce two kinds of sporophylls, the whole fern plant with its crown of fronds, would be very like a flower.

INDEX TO RECENT LITERATURE.

Readers are requested to call our attention to any errors in, or omissions from, this list.

Clute, W. N. *Nephrodium deltoideun.* illust. Fern Bulletin, Ja. 1912.

Clute, W. N. *Rare Forms of Fernworts.—XXI. Another Form of the Christmas Fern.* illust. Fern Bulletin, Ja. 1912.—*Polystichum acrostichoides* f. *lanceolatum* described and illustrated.

Darling, N. *Observations on some Lycopodiums of Hartland Vt.* illust. American Fern Journal, Ap. 1912.

Dodge, C. K. *The Fern-flora of Michigan.* Fern Bulletin, Ja. 1912.—Fifty-eight ferns and thirty-one fern allies listed with notes.

Cockayne, L. *Some Noteworthy New Zealand Ferns.* illust. Plant World, Mr. 1912.

Hill, E. J. *Additions to the Fern-flora of Indiana.* Fern Bulletin, Jl. 1912.—New stations for several species.

Hill, E. J. *The Rock Relations of the Cliff Brakes.* Fern Bulletin Ja. 1912.

Hopkins, L. S. *Lycopodium Selago from Ohio.* illust. American Fern Journal, Ap. 1912.—A form of *L. lucidulum* mistaken for the rarer species.

Prescott, A. *The Osmundas.* Fern Bulletin, Ja. 1912.

Safford, W. E. *Notes of a Naturalist Afloat.—III.* illust. American Fern Journal, Ap. 1912.—Occasional mention of common Ferns.

Schaffner, J. H. *The North American Lycopods without Terminal Cones.* illust. Ohio Naturalist, Ap. 1912.—*Lycopodium porophylum* regarded as of specific rank.

Winslow, E. J. *Some Hybrid Ferns* in Connecticut. American Fern Journal, Ap. 1912.

EDITORIAL.

The last number of this magazine—that for October 1912—will be a comprehensive index of the publication for the past ten years. This, with the index to the first ten volumes, will form an exceedingly valuable index to the fern literature of America, covering, as it does, the whole period of popular fern study. It begins some years before the appearance of any popular fern book and has either published entire all important articles issued since or given a summary of them. Mr. S. Fred Prince, long a member of the Fern Society is already at work on the index and we hope to issue it not later than the end of the year.

* * *

Further information received from the purchaser of the complete set of this magazine recently sent to Germany, apprises us of the fact that the set is not to remain in Europe. It was purchased for a customer in South America (Argentine), therefore the set owned by M. C. Belhatte at Paris is the only one in Europe. The recent set is also the only complete set in South America, and there are not, so far as we are aware, complete sets in other parts of the Old World though the set at the Tokyo Botanical Garden ought to be nearly complete and the set owned by D. Leroy Topping at Manila lacks only two numbers.

* * *

Next year it will be too late to get odd numbers to complete files that lack them. When this magazine goes out of business we shall retain only complete volumes. This is the time for all who need odd numbers to ask for them. We have recently advertised to send any back volume later than volume 9 for 50 cents and this offer will hold good until the end of the year. After that time, single volumes cannot be had unless we happen to have a surplus. We are willing to replace soiled, torn or missing numbers free if requested to do so at once, and the fact that odd volumes will soon be unobtainable should incline all whose sets are incomplete to add the missing volumes while they can.

BOOK NOTES.

In anticipation of the consolidation of this magazine with *The American Botanist* at the end of the year, some very extensive improvements in the new magazine are to be made. Among the more important are a better grade of paper, the use of numerous illustrations, and the addition of enough pages to make it the largest magazine for the price in America. With the beginning of 1913 a department of ornamental gardening will be included in which the cultivation of our showy wild-flowers will receive adequate treatment. This magazine will continue the matter relative to ferns now appearing in *The Fern Bulletin* and all manuscripts used will be paid for. No reader of Fern Bulletin should fail to subscribe for the new *American Botanist* if they wish to keep abreast of the times in botany. Those who subscribe for 1913 before November 20th, will receive the November issue free.

Messrs. Ginn & Co. have nearly ready for publication a book on Agronomy by the editor of *The Fern Bulletin* which should be of interest to all who have anything to do with cultivating plants. Although the book is intended as a school book to be used in connection with gardening courses, the fact that it not only gives directions for planting and cultivating kitchen vegetables and flowering plants, but explains the principles upon which such directions hinge, will make it of much value to the gardener whether amateur or professional. The book, however, is not a mere gardening manual. It discusses soils and their origin, the fundamentals of landscape work and plant breeding, and the effects of heat, light and moisture upon plants in general. There will also be more than 200 illustrations.

FERNS WEIGHING A TON.—In the tropics ferns often attain the height of small trees, but their trunks are usually so slender that they never are of any great weight. For the heaviest trunks we must look among lowlier species, where the circumference of the short trunk in some cases is so great that immense weights are attained. In Australia and New Zealand there grows a relative of the common cinnamon fern named *Todaea barbata* which quite takes the palm in this respect. The trunks are great rounded mosses five or six feet high and at least twenty feet in circumference, most of the upper surface being beset with living fronds. Specimens have been found with trunks that were estimated to weigh more than a ton and a half.

All the American Fern Books

Ferns of Kentucky 12mo	(out of print)
Ferns of North America 2 vols. 4to	(out of print)
Fern Collector's Handbook 4to	(out of print)
Ferns in their Homes and Ours	(out of print)
Our Ferns in Their Haunts 8vo.	$2.15
How to Know Ferns 12mo.	1.60
Fern Collector's Guide 12mo	.54
Who's Who Among the Ferns 12mo	1.05
How Ferns Grow 4to	3.25
Ferns and How to Grow Them 12mo.	1.17
Fern Allies of N. Am. 8vo	2.15
Our Native Ferns 12mo	1.08
Ferns and Allies of New England 16mo.	.50
New England Ferns and Allies 12mo.	1.33
Ferns 4to	3.30
Ferns of the West 8vo. paper	.50
Ferns of Iowa 8vo. paper	.25
North American Pteridophytes paper	.25
How Ferns Grow 4to	3.25
Ferns 4to	3.30
Fernwort Papers 12mo paper	.25
Boston Meeting Paper 12mo paper	.25
Index to Vols. 1-10 Fern Bulletin	.25
Ferns of Upper Susquehanna	.25
Mosses and Ferns 8vo. 1st Ed.	4.00

Any of the above, to which a price is attached will be sent postpaid upon receipt of price.

ADDRESS

Willard N. Clute & Co.

JOLIET, ILL.

WHY OWN WEBSTER'S NEW INTERNATIONAL DICTIONARY THE MERRIAM WEBSTER?

Because it is a NEW CREATION, covering every field of the world's thought, action, and culture. *The only new* unabridged dictionary in many years.

Because it defines over *400,000 Words;* more than ever before appeared between two covers. *2700 Pages. 6000 Illustrations.*

Because it is the *only* dictionary with the new divided page. A "Stroke of Genius."

Because it is an encyclopedia in a single volume.

Because it is commended by the Courts, the Schools, and the Press as *the one supreme authority.*

Because he who knows *Wins Success.* Let us tell you about this new work.

WRITE for specimens of the new divided page.
G. & C. MERRIAM CO., Publishers, Springfield, Mass.
Mention this paper, receive FREE a set of pocket maps.

The American Botanist

For the plant student, amateur or professional. Those who are not subscribers fail to realize the pleasure they are missing. Send for a sample and judge for yourself. Subscriptions 75 cents a year.

Willard N. Clute & Co.
Joliet, Ill.

Reduced Prices

SPENCER LENS CO.
BUFFALO N.Y.

on Microscopes

Lenses and Accessories

Photographic Cameras

Send for my SPECIAL BULLETIN

Includes complete achromatic microscopes of high power at $4.50, $12.50 and upwards.

Excellent Field Glasses

"BEAST AND BIRD SPECIAL"

with large clearly defining lenses, in black sole leather case with strap, sent prepaid for $5.50.

Edward Pennock

3603 Woodland Ave
PHILADELPHIA

Important Notice

The price of the current volume (1912) of *The Fern Bulletin* has ben advanced to $1.00. Only sufficient copies are being printed to supply subscribers and complete files. When ordered with any back number, this volume will be sent for 75 cents.

Address all orders to

WILLARD N. CLUTE & CO., Joliet, Illinois

ANOTHER COPY

We have obtained another copy of Williamson's "Ferns of Kentucky" which we offer for $4.50 postpaid. This volume, the first American fern book, compares very favorably with the most recent. It contains fifty-nine full page plates reproduced from etchings, and is the only fern book so illustrated. More than 150 pages of text give an account of the species. Valued highly for its unique position among fern books, and hard to get at any price, this copy will not remain on hand long. Order at once.

WILLARD N. CLUTE & CO., JOLIET, ILL.

Vol. XX No. 3

The Fern Bulletin

A Quarterly Devoted to Ferns

July

Smithsonian Institution
JAN 22 1913
National Museum.

Joliet, Ill.
Willard N. Clute & Company
1912

The Fern Bulletin

A QUARTERLY DEVOTED TO FERNS

AWARDED GRAND PRIZE AT THE PARIS EXPOSITION

25 CENTS A COPY $1.00 A YEAR

WILLARD N. CLUTE, EDITOR

To insure subscribers against loss of one or more numbers between the expiration and renewal of their subscriptions the journal will be sent until ordered stopped. All arrearages must be paid. Remittances may be made by money order, stamps, currency or drafts and personal checks drawn on Chicago or New York. Checks on other banks must contain 10 cents for collection.

WILLARD N. CLUTE & COMPANY, PUBLISHERS, JOLIET, ILL.

Entered at the Post Office, Joliet, Ill., as second-class mail matter.

60 YEARS' EXPERIENCE

PATENTS

TRADE MARKS
DESIGNS
COPYRIGHTS &C.

Anyone sending a sketch and description may quickly ascertain our opinion free whether an invention is probably patentable. Communications strictly confidential. HANDBOOK on Patents sent free. Oldest agency for securing patents.

Patents taken through Munn & Co. receive *special notice*, without charge, in the

Scientific American.

A handsomely illustrated weekly. Largest circulation of any scientific journal. Terms, $3 a year; four months, $1. Sold by all newsdealers.

MUNN & Co. 361 Broadway, **New York**
Branch Office, 625 F St., Washington, D. C.

VOLUME VI Out of Print

It is not likely that there will be any more "last appearances" of Volume VI. The best we can do now is to begin with volume VII. We offer the next 13 volumes (7-19) for $9.00 and will present to each purchaser a copy of 10 year index, Boston Meeting Papers and Ferns of Upper Susquehanna as well as 3 different numbers of Vol. VI. Single volumes 75 cents.

WILLARD N. CLUTE & CO.,
Joliet, Ill.

SOME SPECIAL OFFERS

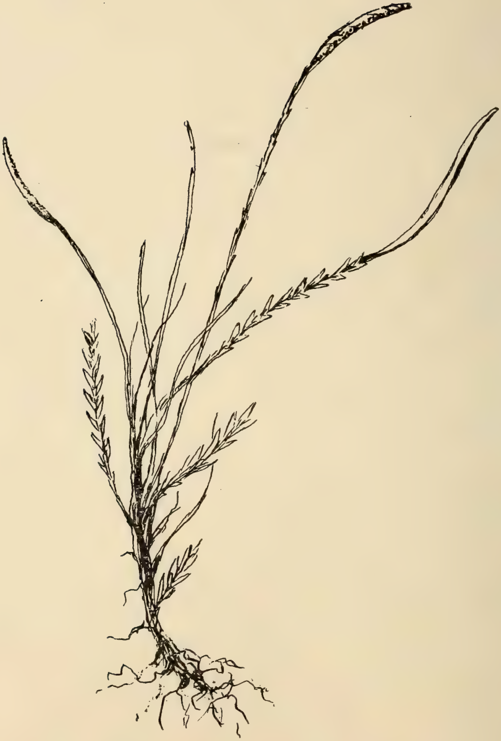
THIS MAGAZINE ONE YEAR	
With any back volume later than Vol. 9	$1.25
With any two back volumes later than Vol. 9	1.60
With set of the Fern Bulletin (Vols. 7-18)	8.00
With the New Gray's Manual ($2.50)	3.00
With a Solid Steel Trowel, 8-in. blade, (40c)	1.00

With any Book or Magazine for 50c additional.

N. B.—Above prices are for subscriptions strictly in advance. Personal checks will not be accepted unless cost of collection is added.

Address all orders to

WILLARD N. CLUTE & CO.
JOLIET, ILLINOIS



XIPHIOPTERIS SERRULATA—Natural Size

THE FERN BULLETIN

Vol. XX JULY, 1912 No. 3

POLYPODIUM OR XIPHIOPTERIS?

BY WILLARD N. CLUTE.

There are times when one has almost a shade of sympathy for those who tinker with generic names. When one gets the characters of a genus well in mind and then in further studies finds specimens referred to that genus which apparently have none of the earmarks of the group he is tempted to think that there might possibly be cases where a change of name would be beneficial. Nor is it the distant and obscure genera that fall into this category. As common and familiar a genus as *Polypodium* has a lot of poor relations or second cousins connected with it, and these are often grouped with more representative species though they may look so little like typical members that it is not easy to see the relationship. If there is one thing that the beginning fern student comes to feel sure of, it is his ability to identify the *Polypodiums* by means of their rounded fruit dots lacking an indusium. This holds good, it is true, for all ordinary occasions, but taking the group as a whole, there are many exceptions to it. Recently a polypody was shown in this magazine in which the sori were apparently linear like those of *Asplenium* and we have chosen for illustration this time another species quite unlike the conventional polypody.

Polypodium serrulatum, whose likeness is presented in the frontispiece is not only unlike a polypody but unlike most other ferns as well. Its small stature and slender leaves suggest a fleeting resemblance to the little curly grass (*Schizaea pusilla*) but it is likely to be overlooked by the ordinary observer who would never expect to find a fern in such a disguise. Small as it is, it has not been unsuccessful in the struggle for existence and is found nearly around the world in the tropics—in the West Indies, Peru, Brazil, Madegascar, the Hawiian Islands and the Guinea Coast, to mention only a few of its haunts.

The fern's grass-like appearance is strengthened by the fact that it often grows in dense colonies. Along some of the mountain paths in Jamaica it is spread so thickly that the hurried collector finds it most convenient to tear up a sod of it and sort the individual plants at his leisure. When growing the plant is from three to five inches tall but it is not safe to jump to the conclusion that the fronds are of that length. As a matter of fact, they are much shorter and the apparent length is due to the fact that the rootstock is nearly erect. The fronds given off at intervals along the rootstock is another touch that adds to its grass-like appearance. The fertile fronds usually appear toward the tip of the rootstock and so are borne higher than those devoted to purely vegetative functions. Like the latter, the fruiting leaves consist of a midrib beset with the finest of tooth-like pinnules which have evidently given the specific name to the plant, but at the tips they are somewhat broader and have nearly entire recurved margins which half enclose the sporangia. The latter are borne in what seems to be a single linear sorus close to the midrib but which the scientist considers several oblong sori that ultimately become confluent.

Owing to its various peculiaities this plant is often ruled out of the genus *Polypodium* and is then placed in the genus *Xiphiopteris*. Although seldom accused of promoting changes in fern names, we confess to a liking for *Xiphiopteris*. The plant from which our drawing was made was collected along the footpath from Cinchona to Morces Gap in the Blue Mountains of Jamaica.

OPHIOGLOSSUM VULGATUM IN NEBRASKA

By James M. Bates.

While collecting plant rusts on Snake Creek, Cherry County, Nebraska, August 21, 1912, my eye caught this strange plant, which I had never seen before. It grew six inches to nearly a foot high. At sight of it I said to myself "That can be nothing but Adder's tongue; what else could Adder's tongue look like?"

It is new to Nebraska, and I think has not been found in Iowa. It agrees perfectly with the descriptions in the manuals. The *Fern Bulletin*, Vol. XX, No. 2 gives but "a single plant" in Herbaria for Illinois. It would be very interesting to learn, now, what localities across the continent warrant the statement of range in our manuals. Britton says "Pr. Edward Island to Alaska, south to Florida." Gray 7th edition gives no range. Small repeats Britton word for word. Nelson's Rocky Mountain Flora knows it not. It is evidently a good "find." There is twenty rods of it at least in a peaty meadow in company with *Eleocharis acuminata, carex interior, Aster junceus, Eupatorium perfoliatum, Spartina Michauxiana, Agropyron pseudorepens,* and such ilk. This swamp is just north of Prideaux Sanford's sod house on Snake Creek, Kennedy, Nebraska, 40 miles southwest of Valentine, the county seat. I give these data so that the knowledge of this location may not die with me.

Red Cloud, Neb.

PRIORITY AND FERN NAMES.

BY WILLARD N. CLUTE.

The subject of botanical nomenclature is one that bids fair to engross the attention of students for a long time to come. The great obstacle to a definite and settled list of plants names, is the fact that no two groups of botanists can agree upon the cognomen a given plant should bear. Here in America we have two distinct codes each with a considerable following. The "Vienna Code" is of world-wide adoption and one would naturally expect it to be supported by all botanists worthy of the name, but so difficult to suit are scientists of this bent that many have adopted a set of rules which they call the "American Code" and will be guided by no other. It may be said that any code would be good enough if, when once made and accepted, no further changes were made in it, but this never seems possible. The makers of a code seem always desirous of adding a few more touches to their handiwork. Like our political law-makers they are prone to leave some "joker" in their rules which makes it possible to undo the work and do it all over again.

Among botanists the greatest joker is "priority" but priority has been found to be no joke. In theory it is desirable to begin with the first name given a species and to call the plant by that and nothing else. but unfortunately there is no way of determining that any given name is first. Many a plant student who is willing to call a plant anything so long as the name is settled, is calling the nametinkers everything because they will not allow what is settled to remain settled. The Vienna rules adopted the date 1753 as the starting point, and a certain book of Linnaeus' as the one beyond which no botanist should go in digging up forgotten names, but alas for human instability, the congress which met at Brussels five years after these rules were made, added a few amendments of its own. It declined to call 1753 the starting point for the nomenclature of all groups and now proposes no less than twenty starting points. It is small wonder that the plant student fails to go far on the road to stability when we consider his numerous starting places. Another thing the Vienna congress did was to establish a list of *nomina conservanda,* that is, a list of plants that are exempt from changes of name without regard to priority. The Brussels congress increased this list, to the great delight of plant students and the corresponding disgust of those whose chief aim in life seems to be the rearranging of plants under different names. The average plant student usually cares little what name a plant bears so long as it is permanent, the name tinker, on the other hand, loses all interest in any species that can not be jarred loose from its scientific cognomen at least once a year.

Why should anybody care anything about priority? Well, it gives them an object in living if it serves no other use. A good many species makers claim they are interested in seeing justice done to the botanizers, plant collectors and herb doctors of an ancient day, but there is a large-sized suspicion abroad that they are more interested in seeing that credit is given to name-tinkers of the present. Those beautiful rules of both the Vienna and "American" codes offer great inducements to the plant-jugglers to continue their abominable practices. In effect they rule that anyone who shall take a plant from one genus, put it in another and get away with it, shall be "honored" by having his name added to the specific name in the "author citation." This absurd proposition has produced a large number of nomenclaturists deeply skilled in the practice of distinguishing differences between tweedledee and tweedledum—or of making such differences if none exist.

But if real priority is the object of the game, why stop at 1753? Many plants were named much earlier. The willow, the oak, and the bracken for instance, were known to Dioscorides nearly two thousand years ago. Why give Linnaeus the credit for these names, simply because they appear in the book which is named as one of the starting points. Those botanists who insist that if priority is to be the game we should play it right and go clear back to Adam if possible, seem to be on the right side of the argument. To delve in the dusty archives of the past with the hope of unearthing a name with which to upset the work of others may seem to some hardly worth the effort, but while the priority fad holds sway, we should not enter into the search half heartedly. Let us give the old names such a shaking up that when they settle they will remain in this condition. Most species makers object to this. According to the *Midland Naturalist* "The strongest objection to historical priority in plant names comes from the type of superficially educated botanists of our day, unacquainted with the greek and latin classics and unable in many cases to make up for their newly discovered genera or species, names that are either grammatical or correct." This writer insists on "Indisputably proved absolute historical priority," but he will not get it if the aforesaid "superficially educated botanists" have their say about it. All in favor of the motion please say "aye." We hear nothing but "nays" —or pehaps one or two neighs and brays may be deteted. The motion is lost.

Once we were inclined to follow those Vienna adherents who shouted "priority" but we soon disovered that we ran a big chance of buying a gold brick. If we favor any further priority it will have to be so securely nailed down that it cannot be pried loose. If priority is a good thing let us have it undiluted, let us go back to Adam at once. That is one way to beat those priority people who are approaching the same end by degrees.

The changes made in our fern names by adhering to absolute historical priority are not as many as might be supposed. The greatest changes are in the author citations rather than in the names themselves. As an evidence of the truth of this statement it may be interesting to run through the list of fern names as they would appear if real priority were followed.

The order in which the ferns occur would no longer be called Filices or Filicales. The names of the families would remain as at present but the order would become Dorsiferae of Rivinius.

Our common sensitive fern would be found in the genus *Angiopteris* of Mitchell and while the ostrich fern, often classed with it, would remain in the genus *Struthiopteris* of Cordus it would get a new specific name and be known as *S. cordi;* thus vanishes *Matteucia* and *Onoclea* as generic names and *Germanica* as a specific appellation.

The absurdity of maintaining the genus *Filix* for *Cystopteris* is shown when it is known that "filix" is literally translated fern and was often used for ferns in general. We see a similar use of it in the words filicales and filices, and yet the name changers solemnly ask us to believe that *Filix* is the proper name for the bladder ferns. How do these nomenclature tinkers keep their countenances when two of them happen to meet? As to the revived use of *Filix* as a genus, it is reported that Adanson, who made this a genus, has very doubtfully connected the bladder ferns with it.

A side light on the battle that once raged about the name of the wood ferns, is given by absolute priority in which it is seen that *Aspidium* is a synonym for the garden plant now known as *Alyssum*, that *Dryopteris* is synonymous with a form of *Asplenium* and that *Thelypteris* recently applied to this group was originally applies to the brackens. This leaves only *Nephrodium* and *Lastrea* to choose from. By sticking to *Nephodium* for fifteen years, despite the suggested changes, we now find ourselves in the fashion again.

By a series of changes several of our small spleenworts find themselves in the genus *Trichomanes* of Dioscorides. Even the silvery spleenwort is included. By a similar shift the common maidenhair is *Adiantum Americanum* Cornuti. *Adiantum* and *Pteris,* by the way, are both credited to Theocritus who flourished about the beginning of the Christian area. This is real priority. The failure of the ancients to invent an alphabet earlier is probably all that saves us from a still weightier dose of "priority." But stay, the Chinese had a system of writing much earlier than this and now that that government has gone republican we may hope in time to follow "priority" back a few aeons more. It would never do to stop at Dioscorides when by so doing we misplaced an honor rightly belonging to the cream of Tartar nobility who may have written on plants some thousands of years before even Adam was born.

If ever that "rule of priority" comes in contact with a parcel of horse sense what a wreck there will be. But who cares? The ferns still survive—call them what you please. And there ought to be enough names at hand now to suit almost anybody.

FERN FLORA OF ILLINOIS.

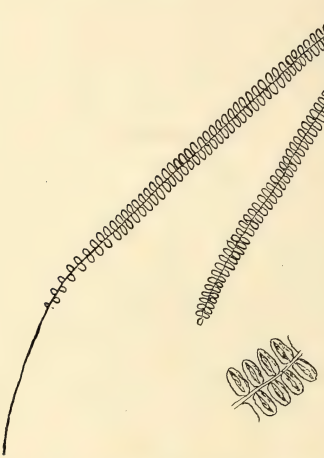
In spite of the efforts of both editor and contributor, an absurd error crept into the "Fern Flora of Illinois" published in the April number of this magazine. The data for *Adiantum pedatum* and *Polypodium polypodiodes* were confused to the extent that the latter species was reported as common throughout the state. *Polypodium polypodioides* is, however, a rare species and found only in the southern part of the state. Its proper range should be given as "On trees and rocks. Jackson county *French;* Wabash, *Schneck;* and southward." The error was not likely to mislead anyone familiar with the species, but in the interests of accuracy the correction is here made.

RARE FORMS OF FERNWORTS.—XXIII.

WHO CAN NAME THIS FERN?

The fern which is illustrated herewith, was collected by Mr. L. H. Hyde while on a trip to New Zealand in 1911. It was found on South Keppel Island where it grew in bunches like grass. Residents in the vicinity say that the fern grows nowhere else; but that is a common impression with regard to an unusual plant or animal in any locality. In this case, however, it is quite likely to be true.

Unfortunately the specimens received are all sterile and unless one is familiar with the fern from other specimens he can only guess at its identity. From the way in which the edges of the pinnules curve toward the midrib it appears like a species of *Pellaea* or *Cheilanthes*. The pinnules are exceedingly small as may be realized from the fact that the illustration is a little larger than natural size. If anybody can name the plant we shall be glad to hear from them.



PTERIDOGRAPHIA.

Ferns in Bottles.—In volume XI of this magazine an account is given of the occurrence of numerous ferns in bottles which had been stuck upside down in the earth. Additional data on this point is given in a recent number of the *British Fern Gazette* where it is stated that in England it is quite a common thing for ferns to spring up in bottles in this way, even in regions where no ferns have been growing. The bottles form so many little wardian cases in which the ferns find conditions very favorable for growth and seem to get along very well without a change of air. The writer of the article mentioned records a case in which a clear glass jar closed air tight for eight years had nevertheless supported a growth of ferns. In size the jar was but eight inches by three inches and neither water or air had been admitted since it was first sealed up This phenomenon has been seized upon as a means of propagating ferns. It is reported that if small pieces of the rootstock are placed in such jars with an inch or so of clean moist sand in the bottom and then tightly sealed up, the pieces of rootstock will in time evolve new buds and roots and these will eventually become sturdy little plants. The point at which rootstock and stipe join, seems to be the region that most readily produces buds, but any living part of the rootstock may be depended on to do so in time.

NEW STATIONS FOR FLORIDA FERNS.—In the "Fern Flora of Florida" published in Volume XII of this magazine, the range of the golden polypody (*Polypodium aureum*) was given as northward nearly to St. Augustine. Its known range is now extended by Mrs. M. W. Satchwell who has found it in several places about Jacksonville a considerable distance farther north. In the same country (Duval) she also finds *Botrychium obliquum, Asplenium ebeneum* and *Polystichium acrostichoides,* plants which heretofore were known only from the extreme north western part of the state. Duval county is on the east coast and some distance from the state line.

Additional Fern Pests.—It certainly does make a difference whose ox is gored! The fern student who finds a big fat grub eating the heart out of some choice specimen is likely to vote it an unmitigated nuisance, but the student of boring larvae would view the prize with delight. It seems that there is still a good deal to be found out about these larvae and the possibility of locating an occasional new species is good. The underground parts of many flowering plants are infested with such larvae and in most cases they seem to be pretty closely restricted to a single host plant, and do not occur outside the region inhabited by the plant. Among ferns which serve as hosts for borers are the sensitive fern and the brackens. Any fern with a rootstock of some size, however, may be suspected of harboring these insects, and only last summer Mr. Henry Bird of Rye, N. Y., found an unknown species in the rootstock of the common chain fern (*Woodwardia*). Mr. Bird is an authority on borers of all kinds and will be glad to name specimens sent in. When one finds a grub burrowing in the tissues of a plant, he should cut off sections containing the insect and, enclosing them in some small box, mail to Mr. Bird. The larvae do not seem very destructive to the ferns, but now is a good time to get the pests properly labelled.

Number of Articles on Ferns.—There is annually published in Germany a summary of all the publications on ferns in the world. The summary, however, lags somewhat and that for 1909 has just appeared. Glancing through preceding issues it is interesting to observe how the number of articles on ferns varies from year to year. From 1902 to the end of 1909 there were over 3600 articles published. For the years these are as follows: 1902, 425; 1903, 434; 1904, 516; 1905, 460; 1906, 436; 1907, 447; 1908, 462; 1909, 465. The country most prolific in publications on ferns is Germany. Twice, however, in 1907 and 1908, America has lead in the production of fern literature but in 1909 the palm went back to Germany. As might be assumed, the bulk of the articles published deal with ecology, taxonomy and distribution. More than half of the total are on these subjects.

A NEW EQUISETUM.—In a recent number of the *Ohio Naturalist* John H. Schaffner describes a new species of *Equisetum* from Kansas. This is said to be an annual species, that is, the aerial stems do not survive the winter, but in other respects it is closely allied to *E. hyemale.* In this connection the late A. A. Eaton's statement that one might pick out a series of closely connected specimens from the largest to the smallest species is especially pertinent. There is no doubt that the group of plants which we have long called *Equisetum hyemale* consist, either of several species as the world now regards species, or else the species itself is extremely variable. The plants once referred to *Equisetum robustum* are now considered only a large form of *hyemale* and the plants which Eaton named *E. hyemale intermedium* are regarded by the describer of this new species as mere forms of *E. laevigatum.* It is seen, therefore, that botanists are by no means agreed as to what should constitute a species in this group. Schaffner makes two groups of these forms. One with persistent aerial stems which are more or less rough and fruiting cones tipped with a point. In this group are included as species *E. hyemale, E. robustum* and *E. laevigatum.* In the second division is placed the new species which is named *E. Kansanum.* It is described as having annual smooth aerial stems and cones lacking a point. It may be mentioned here, that many of the characters relied upon for distinguishing species of *Equisetum* are worthless. The presence or absence of black bands on the sheath is largely a matter of soil, exposure and age. The form of branching is another feature without significance taxonomically though it does have a physiological relationship. None of the first year stems of the evergreen *Equisetums* branch if uninjured. If they live through the winter a renewal of growth may induce branching, especially if the tip has been broken off or killed back. The most reliable characters must always be taken from the nature of the stem—the number of grooves on the exterior, the size and position of the canals in its substance, the length of the joints and the size of the central hollow. It is very likely that exhaustive study will show that the genus *Equisetum*, at least in the exergreen and normally unbranched section, does not present a series of forms as clear cut as we find them in other parts of the vegetable kingdom.

TWO NEW FERN SPORTS.—In nearly every greenhouse where ferns are grown for sale will be found specimens of the holly fern (*Crytomium falcatum*). Its thick and glossy fronds are prime favorites with all who maintain living collections of ferns. Recently a laciniate sport has arisen from this which is now offered to the trade as *Cyrtomium Rockfordianum* though it should, of course, be *Cyrtomium falcatum* f. *Rochfordianum* if it deserves a name at all. Still another sport has been produced from *Adiantum tenerum.* The fern usually called *Adiantum Farley-*

ense is regarded as a sterile crested form of *tenerum* but as it apparently is always sterile, it is difficult to make sure on this point. The new sport is more certainly referred to its species because it bears fertile spores. These spores are said to reproduce the variations of the parent. The sport resembles the form *Farleyense* in being crested but is said to be much hardier. Thus far it has escaped a scientific name and is being sent out as the "glory fern" or "glory of Moordrecht."

NEW SOUTHWESTERN FERNS.—In *Muhlenbergia* for September, Leslie N. Gooding describes no less than five species and varieties of ferns from Arizona and an additional species from over the border in Mexico for good meaure. No illustrations are given and as no material is at hand it is difficult to judge of the distinctness of the forms mentioned. Dr. Aven Nelson is reported to have seen the specimens which indicates that they may be good species. The single form described is called a new variety, *grandidentatum, of Asplenium parvulum.* Of the new species, one, *Asplenium rupium,* is in a genus in which it is not easy to make mistakes, but the others—*Notholaena hypoleuca, N. Cochisensis, Cheilanthes Sonorensis* and *Pellaea truncata*—are in genera in which the species already described are none too clear. It is to be hoped that illustrations of these ferns may be given in some botanical journal. This is especially desirable since no types are designated in the article describing the ferns though by implication they may be assumed to be in the University of Wyoming herbarium.

Death of James Goldie.—With much regret we record the death of James Goldie which occurred at his home in Guelph, Canada, November 3rd, 1912, in the 88th year of his age. The passing of James Goldie severs another interesting link connecting us with the past, for he was the son of that John Goldie after whom *Nephrodium Goldieanum* was named. The elder Goldie was born in Scotland 120 years ago and came to America in 1817 on a botanical collecting trip at the suggestion of Sir William Hooker. He spent several years in this work in Canada and the Middle States and dispatched three different collections to Europe but had the misfortune to lose all of them by shipwreck. Making a fourth collection he took ship himself and at last got safely home. In this last collection was the wood fern which has since borne his name and which was named in his honor by his patron, Hooker. In 1824 Goldie was engaged by the Russian government to aid in forming the botanical garden at St. Petersburg and in 1844 with his family he returned to America, settling at Ayr Ontario. Here he resided until his death in 1896 at the age of 94 years. James Goldie had much of his father's interest in plants though he did not make a profession of botany. He has been a subscriber to the *Fern Bulletin* almost since its beginning.

Crested Christmas Fern.—The Christmas fern (*Polystichum acrostichoides*) is so common as to be known to almost anybody, and yet it is a question whether it has ever been found with crested fronds until discovered recently by Mr. Amedee Hans near Locust Valley, Long Island, N. Y. Mr. Hans writes that he has been trying for a long time to develop a crested form of this species or at least a crested form resembling it, by crossing it with crested forms of *Polystichum angulare* but without success. Now he has found a wild plant with the desired characteristic and expects soon to have plenty of the new form since sporelings are likely to repeat the aberrations of their parents and the plants found were in full fruit. With the exception of the tips, the fronds are quite like those of normal specimens. At the tip, however, the midrib divides again and again forming a compact little tuft. In writing of it Mr. Hans calls it *cristatum* and as the plant is better handled in literature if given a name it would be well to christen it *Polystichum acrostichoides* f. *cristatum.*

FERN FLORA OF INDIANA.—Since the publication of "The Fern Flora of Indiana" in the October 1911 number of this magazine, E. J. Grimes has reported one species new to the state list and recorded several additional stations for species previously known to grow in the state. *Ophioglossum vulgatum* previously known only from the southern part of the state and from one station in the extreme northwest, is recorded from Putnam county, near the center. In the same county *Woodsia obtusa* is said to grow sparingly on sandstone ledges. *Asplenium trichomanes* is also reported from this county as well as from Parke and Montgomery counties all these being new stations. *Nephrodium noveboracense,* apparently nowhere abundant in the state is reported from Parke county. The species new to the state is *Marsilia quadrifolia.* This was found "South of the Vandalia station at Greencastle in an old pond." The species is reported as being abundant on one side of the pond, though rapidly disappearing before the encroachments of other vegetation. The species which has undoubtedly been introduced is said to have been noticed first by Dr. Barker of De Pauw University in 1904.

FERNS AS WEEDS.—Although ferns grow in great abundance in suitable spots throughout the world it is seldom that they become weeds. In newly cleared land in temperate regions the bracken may persist for a few seasons, and compete with the cultivated plants and nearer the equator other species may plague the cultivator in the same way, but in such cases the plants lack one of the essential qualities of weeds, namely, the ability to multiply and spread into new regions. As a general proposition ferns are not increasing in numbers anywhere. The nearest approach to this condition is seen in some of the fern allies. The field horsetail (*Equisetum arvense*) is undoubtedly a weed and quite able to spread into new territory, but with the exception of its harmful presence in low meadows, it may be questioned whether it is not more helpful than the reverse in which case it cannot be called a weed. Certainly a good many railway embankments are kept from washing by the matted stems and rootstocks of this species. And even in such places it seldom spreads at the expense of other plants. It is only when there is room that it takes an area to itself. The same is true of the water clover (*Marsilia*) and the azolla. They may fill up ponds where they gain a foothold but not to the exclusion of other species. In the topics, also, a few ferns may behave in the same way. *Pteris longifolia,* and *Adiantum capillus-veneris* are fond of growing on old walls of every description and several others may take up positions on the roofs of houses, but though a weed has been defined as "a plant out of place" and these are certainly out of place, they can only be called weeds by stretching the intent of the definition. As for ferns invading new territory as other weeds do, it may be doubted if such a case exists in the temperate zone.

BERMUDA FERNS.—Although the climate of the Bermudas verges on the tropical, its soil does not support a very luxuriant fern flora. What species there are, however, are mostly common plants of the American tropics such as *Acrostichum aureum, Polypodium plumula, Pteris longifolia, P. caudata, Asplenium dentatum, A. myriophyllum, Nephrodium patens, Nephrolepis exaltata,* and *Polystichum adiantiforme.* A few species have been derived from North America, among which may be mentioned, *Osmunda cinnamomea* and *O. regalis, Woodwardia Virginica,* and *Nephrodium thelypteris.* Four species are supposed to be endemic, namely, *Nephrodium Bermudianum, Asplenium Laffanianum, Adiantum bellum* and *Nephrodium speluncae.* Other species reported are *Asplenium muticum, Anopteris hexagona, Psilotum nudum* and a *Salvinia.* In addition to these, collectors find *Adiantum capillus-veneris, A. cuneatum* and various other species commonly cultivated but the latter are believed to be escapes and not native. It is probable that the entire fern flora of Bermuda does not contain twenty-five different species. Very little attention has been paid to Bermuda ferns in American publications. The only list with notes seems to be that of B. D. Gilbert, published in *Torrey Bulletin* fifteen or more years ago.

TREE FERNS.

Tree ferns are characteristically inhabitants of wet, forested, tropical and subtropical regions and reach their best development in mountainous districts which are not subject to drouth or pronounced seasonal change. In the Greater Antilles they are found mainly on the northern slopes and summits of the higher mountains, as for example, the Sierra Luquillo of Porto Rico and the Blue Mountains of Jamaica, where the cool moisture-laden trade-winds from the northeast bring an ample supply of moisture. The fern vegetation to the south of these mountains is more or less strongly xerophytic both islands mentioned even having a semi-arid region of cactus and scrub growth. Similar conditions were noted on the Sierra Maestra of Cuba. Here on the comparatively dry southern slopes of the peak Torquino, at 3,500 feet, I found plants of *Cyathea arborea,* a species which in Jamaica and elsewhere in the West Indies rarely ascends to more than 2,500 feet.

Similar conditions upon a grander scale are observed upon the continent, the tree ferns being practically confined to the humid Atlantic slopes and to the high mountains. Thus in the mountainous parts of eastern Guatamala (Alta Verapaz) where, according to the native saying "It rains 13 months out of every 12" tree ferns are exceedingly abundant, a few species occurring at or near sea level but the most of them at from 4,000 to 6,000 feet altitude. West of this region, in the dry interior basin, they are wanting; and only two species, *Cibotium Wendlandti* and *Hemitelia costaricensis* are reported from the higher region near the

Pacific, even the moist forest belts of the volcanoes Fuego and Agua having none so far as known.

In Mexico, also, as might be expected, tree ferns are wanting from the interior arid high plateau region whose flora has been so thoroughly investigated during the past 35 years. Upwards of 20 species of Cyatheaceae are known from Mexico, but almost the only recent material of these is that secured upon occasional excursions from the table land into the moist lower regions bordering the *tierra caliente* of Vera Cruz.

In the several regions mentioned a few tree ferns are found to be partial to the lowlands. Among the West Indian species of this class may be noted *Cyathea arborea,* which, however, as already explained, exceptionally occurs high up on the southern slopes of the Sierra Maestra finding there congenial surroundings which are wanting at a lower altitude in this region. Upon the continent, *Alsophila microdonta* is found near sea level from Mexico along the Atlantic to South America. *Alsophila myosuroides* shows a similar preference for low altitudes, its known range extending on the mainland from Vera Cruz to Honduras and including also, Cuba and the Isle of Pines. Another very remarkable species of *Alsophila* (*A. Blechnoides*) ranges along the Atlantic coast from Guatemala to Trinidad.

Certain tree ferns occur typically as undergrowth in the dense shade of lofty forest trees; for example *Cyathea gracilis*, a Jamacian species which grows usually in peaty soil in wet, sheltered depressions. The trunks of this, though commonly short,sometimes reach 8 to 12 feet, whereupon, according to Jenman they "frequently fall and lie procumbent though this does not much affect their growth." In the mountain ravines of Java and Malaya there occurs, also, according to Christ a definite thicket formation of tree ferns "over which the crowns of the forest trees form a second forest." A similar "under forest" formation in which screw pines (*Pandanus*) are associated with tree ferns is mentioned from Celebes. These dwarf tree fern associations at high altitudes are believed to fill the important role of conserving the moisture by preventing radiation and the consequent drying out of the forest floor.

Perhaps a majority of tree ferns, however, occur as an integral part of the predominant forest growth, their crowns often rising nearly or quite to the level of the tree tops or in not a few species exceeding it as, for instance *Cyathea pubescens* one of the tallest Jamaican species which attains a height of 40 feet or more upon the heavily forested higher ridges of the Blue Mountains and easily thrusts its crown above the surrounding deciduous forest. There are also certain species, like *Cyathea furfuracea, Alsophila parvula,* and *Cyathea insignis* which in Jamaica grows indifferently in open or shaded situations though their occurrence in the open may have followed naturally from the partial and piecemeal clearing of the land, the small cleared patches remaining under cultivation for only a year or two before rapidly growing up to bush.

At least one species, *Cyathea arborea* flourishes in open situations commonly in very large colonies. Jenman has described it in Jamaica as "gregarious, often covering acres on fully exposed slopes everywhere shunning shade." Perhaps on the latter account and also because of its ubiquity it is found more commonly than any other about dwellings and plantations, its huge lace-like fronds lending an unusual decorative charm to scenes already novel and interesting to northern eyes. The formation of groves of this species in relatively dryish open situations is almost unique for the family although a few, (e. g. *Alsophila armata*) are more or less gregarious in partial shade and many others of our American species are found in colonies in the deep wet forests. In New Zealand the social tendency has even resulted in the formation of large groves under intensely humid conditions. One of these which Colenso came upon in the forest called "Seventy-mile bush" in North Island is described by him as follows:

"On a flat in the heart of the forest, in a deep hollow lying between steep hills, the bottom which for want of drainage was very wet and uneven and contained much vegetable mud and water even in the driest summer season I found a large and continuous grove or thicket of very tall tree ferns, chiefly *Dicksonia squarrosa* and *D. fibrosa* with a few *Cyathea dealbata* intermixed, with but few forest trees and shrubs growing scattered among them. I suppose they occupied three rods of ground and I estimated their number to be 800 or 1,000. They were all lofty, from 25 to 35 feet high and in many places growing so close together that it was impossible to force one's way through them."

The stem or trunk of the *Cyatheaceae* varies greatly in dimensions, shape, and direction, and in most characters of outward appearance and covering though for a given species these features are, with a few exceptions fairly constant in mature individuals. The tallest tree fern known is *Alsophila excelsa* a nearly extinct species occurring upon Norfolk Island to the east of Australia whose trunks John Smith has stated to measure from 60 to 80 feet in length. Scarcely inferior to this is *A. Macarthuri* found upon Lord Howe's Island which, according to Maiden attains a height of from 60 to 70 feet. Among American species, the nearest approach to these dimensions of length is found, perhaps, in *Alsophila armata* which Jenman records as sometimes reaching fifty feet in Jamaica, "the head gradually diminishing in size as the stem lengthens."

The smallest member of the family in the world is *Alsophila Kuhnii* recently described from the Cordillera of Colombia in which the short rootstock is erect and the leaves, including the leafstalks, are but 8 inches long and the blades less than 1¼ inches broad. The smallest of the North American species is the Jamaica *Cyathea Nockii* looking most like some coarse bipinnate wood fern, its relatively stoutish stem 4 to 8 inches long, prostrate upon the ground and rooting underneath, its fronds 1 to 3½ feet long borne in a crown.

The leaves of the *Cyatheae* vary in length from one to fifteen feet. In position they have been mentioned as arching in a semi-erect crown, spreading or even drooping. In many species of *Cyathea* and *Alsophila* and less commonly of *Hemitelia*, the trunks are more or less completely covered with spines, a fact which no one who has reached out hastily and grasped one in a futile attempt to stay his descent down some steep, slippery, forest-clad slope is likely to deny. As a rule, however, the trunks are spiny simply from the partial persistence of the broken stipe bases which indisputably are spiny. In certain species the spines are long straight, columnar and blunt; in others low and broadly conical with a hooked point; in still others slender and sharp but very short and closely set. In color, spines range from yellow to brown, purple, and black, usually taking the color of the stipe or presenting a darker and highly polished surface.—*From an article by W. R. Maxon in Smithsonian Report for 1911.*

OWNERS OF COMPLETE SETS.

As this magazine closes its existence, it will be of interest to again indicate the whereabouts of the few complete sets that are known to be in existence. So far as we can ascertain these number thirty-one, three of which are owned outside of the United States. There are several sets that are known to be nearly complete. Mr. D. Le Roy Topping, of Manila, P. I. and Mr. W. A. Poyser, of Hammond, Indiana have sets lacking only one or two numbers, and the set owned by the late B. D. Gilbert, now in the public library Utica, N. Y., lacked only four pages of completeness. Several of the larger public libraries have files that are nearly complete. The perfect sets are as follows:

ARTHUR, DR. J. C., Lafayette, Ind.
BARNHART, DR. J. H., Tarrytown, N. Y. (Two copies).
BELHATTE, C., Paris, France.
BROOKS, MRS. WM. F., New Britain, Conn.
BURR, J. H. TEN EYCK, Rome, Italy.
CHASE, VIRGINIUS H., Barclay, Kans.
COFFIN, MRS. JUDITH, H., Newburyport, Mass.
CLUTE, WILLARD N., Joliet, Ill.

Farlow, Dr. W. G., Cambridge, Mass.
Fitzpatrick, Prof. T. J., Los Angeles, Cal.
Graves, Dr. C. B., New London, Conn.
Hutchinson. Miss H. D., Mattapan, Mass.
Jenks, Chas. W., Bedford, Mass.
Maxon, W. R.,Washington. D. C.
Noyes. Miss Elmira E.. Portsmouth. Va.
Oleson. O. M., Fort Dodge, Iowa.
Sage, John H.. Portland, Conn.
Smith, Mrs. A. M., Brooklyn, N. Y.
Stevens, Mrs. M. L., Brookline, Mass.
Terry, Mrs. E. H., Northampton, Mass.
Wheeler, Miss Harriet, Chatham, N. Y.
Boston Public Library, Boston, Mass.
Columbia University, New York City.
Lloyd Library, Cincinnati, Ohio.
Massachusettes Horticultural Society, Boston
Michigan Agricultural College, Mich.
New York State Library, Albany, N. Y.
U. S. National Museum, Washington, D. C.
University of Illinois, Urbana, Ill.
Argentine Republic, owner of copy unknown.

INDEX TO RECENT LITERATURE.

Clute, W. N. *A Problematical Fern.* illust. Fern Bulletin, Ap., 1912.—The position of *Gymnogramma lanceolata* discussed.

Clute, W. N. *Rare forms of Fernworts.—XXII. Still Another Christmas Fern.* illust. Fern Bulletin, Ap., 1912.—A form with truncate pinnae and projecting midveins described as *Polystichum acrostichoides* f. *Gravesii.*

CORNE, F. E. *Another Station in Central Vermont for Dryopteris filixmas and for the New Hybrid Filixmas x Marginalis.* American Fern Journal, Jl., 1912.

DODGE, R. *Further Notes on Variation in Botrychium ramosum.* Fern Bulletin, Ap., 1912.

HILL, E. J. *The Fern Flora of Illinois.* Fern Bulletin, Ap., 1912.—A list of 39 ferns and 17 fern allies given, with notes.

PRESCOTT, A. *The Tall Spleenworts.* Fern Bulletin, Ap., 1912.

PRINCE, S. F. *Notes on Various Ferns.* Fern Bulletin, Ap., 1912.

RUGG, H. G. *Vermont the Fernlovers Paradise.* American Fern Journal, Jl., 1912.

SAUNDERS, C. F. *Schizaea pusilla at Home.* Fern Bulletin, Ap., 1912.—Reprinted from *Linnaean Fern Bulletin,* Vol. 4.

PTERIDOGRAPHIA. Fern Bulletin, O., 1911. *Black Spleenwort in America, Crested Ferns, Crested Marginal Shield Fern. Ferns for the House, Living Ferns found Fosil, Range of Cystopteris.*

PTERIDOGRAPHIA. Fern Bulletin, Ja., 1912. *Alaska Fern, Filmy Ferns in Dry Regions, New Panama Club Mosses.* The *Bracken as a Weed, Woodwardia on Cape Cod.*

PTERIDOGRAPHIA. Fern Bulletin, Ap., 1912. *Affinities of Taenitis, Apospory in Pellaea, a New Fern Pest, Ferns Weighing a Ton, Sporophyll zones, Stipe or Stipes, Walking Fern and Lime, Lycopodium Lucidulum porophylum.*

EDITORIAL.

With this number of *The Fern Bulletin,* its existence as a separate publication practically comes to an end. A comprehensive index to the past ten volumes is already in the printers hands and will constitute the fourth number of this volume and the last of its existence. This is probably the first case on record of a magazine ceasing publication for lack of material to fill it. Usually it is the lack of subscribers that causes the demise of special publications but fortunately this is not the case in the present instance.

There is an evolution in magazine-making as in everything else. Magazines devoted to special subjects spring up, have their day and when their cycle is completed must move onward or die to make way for something else. When *The Fern Bulletin* was established there was abundant reason for its existence for there was not a single book devoted to the popular side of fern study in America. Only a few advanced botanists knew much about this interesting race of plants, and the study was full of conjecture and assumption in place of reliable facts. Many of what we now consider fairly common species were unknown, the ranges of all ferns were hazily defined and the interesting features of their life histories were practically unknown. Today the situation is far different. Any beginning student can find in the nearest library half a dozen books that will quickly and surely guide him to the name of his specimens and tell him all the important facts of their existence. What has been said of the ferns applies with still greater force to those plants which for want of a better name are called the fern allies. For a long time after popular fern study had been taken up, they remained unknown, confused in the collectors mind with mosses and other low forms. But even these have at last become familiar and if books on the subject have not multiplied with the rapidity of books devoted to ferns, still, largely through the efforts of this magazine, the fern allies are now easily named and their characteristics discovered. The need for a magazine especially devoted to ferns has passed. The few new facts that develop from time to time can as well be published in journals devoted to general botany.

The reduction of fern study to a science has not been accomplished without much hard and critical work by numerous investigators among which may be named Eaton, Gilbert, Graves, Dodge, Maxon, Parsons, Waters, Parish, Jones, Slosson, Hill, and Ferriss, but we feel warranted in saying that none have done more for the advancement of the study than this magazine and it is a source of pleasure to reflect that when the history of the last quarter of a century is written the magazine's achievement must hold a prominent place. With the aid of many contributors we have made the obscure clear, the unknown known, the rough places smooth, the acquiring of knowledge easy, but it can never happen again. The work of *The Fern Bulletin* is done.

As the facts about ferns became established and were preserved in books the supply of useful articles on ferns began to diminish. The end was easily perceived by one of any penetration and several years ago we announced the beginning of the end. We could not refrain, however, from carrying on the work to the end of the twentieth year. There is some satisfaction to be had from the contemplation of a work continued successfully for such a natural period of time as the fifth of a century. Only two other botanical magazines have accomplished it and neither of these were individual enterprises. Both had the backing of a club or association. The lack of suitable manuscripts relating to ferns, however, is patent to all. The current volume of a well-known eastern magazine devoted to botany failed to include a single note on ferns. Of the twelve articles in the latest number of the only Old World fern journal eleven are written by one individual, the editor, while an American publication which claims to be devoted to ferns published in its last issue only two fern articles and filled the rest of its space with notes of travel.

Quite aside from what this magazine has accomplished for the study of ferns it has made several unique records. It is the only botanical publication in this country that has existed under a single editor for a fifth of a century, and it is the only one at present that depends upon its resources and does not look to some group of benevolent individuals to make good a possible deficit; in fact it never has had a deficit, in this presenting a striking contrast to its competitors. Although we have often been obliged by circumstances to lag behind our dates of issue we have a record of never doubling up on a volume by issuing one number in place of two. Moreover, considering the number of pages published the price has always been lower than any other. From *The Fern Bulletin* has also sprung another important journal, *The Bryologist*. For two years this publication was issued as part of *The Fern Bulletin* and only became a separate publication with the beginning of its third volume. Later it became the organ of the Sullivan Moss Chapter,a society which was organized at the suggestion of the editor of *The Fern Bulletin*. The first printed reference to such a society was in the editorial pages of this magazine, and while the editor took a less active part in the formation of this society than he did in forming the American Fern Society, it is nevertheless true that both these important societies owe their existence in the beginning to his efforts. In a less remote sense can this magazine be said to have suggested the establishment of *The British Fern Gazette* though for some years before that magazine appeared the need for such a publication was urged and it is more than a coincidence that the magazine is almost an exact duplicate of *The Fern Bulletin* in size and typography. Its editor, however, has marked out a very different field of operations and the publication bids fair to hold the same relation to fern study in Britain that *The Fern Bulletin* has held so long on this side of the water. In passing it would give us pleasure to emphatically disclaim any connection with the founding of another recent publication which aspires to take up the burden we are about to lay down, but though we did much to discourage its appearance, we have some suspicion that if it were not for us the publication would not be here. That it may fall heir to all the problems of *The Fern Bulletin* is our sincere wish.

The editing of this magazine for twenty years has not been an unmixed pleasure. There have been times when but for our interest in the ferns themselves we would have gladly shut up shop, but looking back through the years, we realize that the pleasure has overbalanced the disappointment. The work has brought us many strong friends and spiced the mixture with a few misguided enemies. Our contributors and subscribers have not spared themselves in pushing the magazine forward and we again extend to them our thanks with a full realization of how poorly the words express the gratitude we feel. We lay down the pen with gladness, though we part company with its associations with a keen sense of regret. Another chapter is closed but over the leaf a new one begins. Though *The Fern Bulletin* be dead, its spirit will live in the pages of *The American Botanist* into which it now merges.

WILLARD N. CLUTE.

With the increase in size of the *American Botanist*, the price to new subscribers advances to $1.00. Old subscribers and any who have ever been subscribers may secure the magazine at the old rate of 75 cents by subscribing before the end of February. This same offer is made to all subscribers to *The Fern Bulletin.* The new magazine will be the largest for the price and by far the best illustrated magazine in the United States. It will continue to publish everything of interest about ferns and every reader of this magazine will need it. A subscription now will not only save 25 cents, but it will entitle the subscriber to the magazine at that rate as long as desired.

All the American Fern Books

Ferns of Kentucky 12mo..........................	(out of print)
Ferns of North America 2 vols. 4to	(out of print)
Fern Collector's Handbook 4to	(out of print)
Ferns in their Homes and Ours	(out of print)
Our Ferns in Their Haunts 8vo.	$2.15
How to Know Ferns 12mo..	1.60
Fern Collector's Guide 12mo	.54
Who's Who Among the Ferns 12mo	1.05
How Ferns Grow 4to......	3.25
Ferns and How to Grow Them 12mo.	1.17
Fern Allies of N. Am. 8vo..	2.15
Our Native Ferns 12mo...	1.08
Ferns and Allies of New England 16mo.	.50
New England Ferns and Allies 12mo.	1.33
Ferns 4to	3.30
Ferns of the West 8vo. paper	.50
Ferns of Iowa 8vo. paper..	.25
North American Pteridophytes paper	.25
How Ferns Grow 4to.....	3.25
Ferns 4to	3.30
Fernwort Papers 12mo paper	.25
Boston Meeting Paper 12mo paper	.25
Index to Vols. 1-10 Fern Bulletin	.25
Ferns of Upper Susquehanna	.25
Mosses and Ferns 8vo. 1st Ed.	4.00

Any of the above, to which a price is attached will be sent postpaid upon receipt of price.

ADDRESS

Willard N. Clute & Co.

JOLIET, ILL.

A NEW CREATION

WEBSTER'S NEW INTERNATIONAL DICTIONARY

THE MERRIAM WEBSTER

The *Only New* unabridged dictionary in many years.

Contains the *pith* and *essence* of an authoritative library. Covers every field of knowledge. An Encyclopedia in a single book.

The *Only* Dictionary with the *New Divided Page.*

400,000 Words. 2700 Pages. 6000 Illustrations. Cost nearly half a million dollars.

Let us tell you about this most remarkable single volume.

WEBSTER'S NEW INTERNATIONAL DICTIONARY
WEBSTER'S NEW INTERNATIONAL DICTIONARY
LATEST AUTHENTIC EDITION OF THE MERRIAM SERIES
G. & C. MERRIAM CO.

Write for sample pages, full particulars, etc.

Name this paper and we will send *free* a set of Pocket Maps

G. & C. Merriam Co.
Springfield, Mass.

The American Botanist

For the plant student, amateur or professional. Those who are not subscribers fail to realize the pleasure they are missing. Send for a sample and judge for yourself. Subscriptions 75 cents a year.

Willard N. Clute & Co.
Joliet, Ill.

Reduced Prices

on Microscopes

Lenses and Accessories

Photographic Cameras

Send for my SPECIAL BULLETIN

Includes complete achromatic microscopes of high power at $4.50, $12.50 and upwards.

Excellent Field Glasses

"BEAST AND BIRD SPECIAL"

with large clearly defining lenses, in black sole leather case with strap, sent prepaid for $5.50.

Edward Pennock

3603 Woodland Ave
PHILADELPHIA

Important Notice

The price of the current volume (1912) of *The Fern Bulletin* has ben advanced to $1.00. Only sufficient copies are being printed to supply subscribers and complete files. When ordered with any back number, this volume will be sent for 75 cents.

Address all orders to

WILLARD N. CLUTE & CO., Joliet, Illinois

ANOTHER COPY

We have obtained another copy of Williamson's "Ferns of Kentucky" which we offer for $4.50 postpaid. This volume, the first American fern book, compares very favorably with the most recent. It contains fifty-nine full page plates reproduced from etchings, and is the only fern book so illustrated. More than 150 pages of text give an account of the species. Valued highly for its unique position among fern books, and hard to get at any price, this copy will not remain on hand long. Order at once.

WILLARD N. CLUTE & CO., JOLIET, ILL.

An Index
to the
Fern Bulletin

Volumes One to Ten

(1893—1902)

Smithsonian Institution
JUN 18 [illegible]
National Museum

Compiled by B. D. Gilbert for
the Linnaean Fern Chapter . .

BINGHAMTON, N. Y.
WILLARD N. CLUTE & CO.
1904

PREFACE

The following Index is separated into five parts, viz., General Index, Index to Species Mentioned, List of Contributors, List of Publications Noticed, and List of Illustrations. The first part contains all communications that are signed, together with editorial and other matter. In the second part every species is indexed about which any fact is stated, but not when it is included in a mere enumeration of what was seen in connection with some other species which is the subject of the article. Nor, as a rule, are foreign species indexed unless they occur also in this country. Where a variety occurs, if it is not indexed separately, its name follows immediately after the number of the page, and is enclosed in brackets. All names of genera and species are indexed exactly as they are used in the text: if *Aspidium* is originally used then it is so catalogued, and the same with *Dryopteris,* or *Nephrodium,* or *Athyrium,* or whatever it may be.

The first twelve numbers of the BULLETIN were numbered consecutively and paged separately, not being in volumes. This makes them a little awkward to index; but, in order to indicate these early issues, hyphenated numbers have been resorted to, the figure before the hyphen indicating the number of the issue, and that after the hyphen telling the page of that particular number. After these issues, the figures bear their usual meaning of volume and page. The articles A and THE are not used as index words, but following after the rest of the title, with a comma between.

B. D. GILBERT.

GENERAL INDEX

A

Abnormal British Ferns.—*Charles T. Druery.* **9**: 9.
Abnormal Fruiting Forms of Osmunda cinnamonea.—*C. D. McLouth.* **5**: 7.
Adaptability of Ferns to Light.—*C. E. Waters.* **7**: 8.
Adiantum Capillus-Veneris, Extension of Range of.—*F. Peyton Rous.* **4**: 64.
Adiantum Capillus-Veneris in Dakota.—*C. E. Bessey.* **7**: 14.
Agassiz Association, Proposed Collection of Ferns for. 3-10.
Alaska, Ferns Growing in. **4**: 48.
Amendment, A Proposed. 3-7.
American Botanical Club. **10**: 93.
American Ferns, Notes on.—*William R. Maxon.* **8**: 29, 58, 84. **9**: 59.
Anacamptodon splachnoides. **6**: 41.
Another Locality for Schizaea.—*Mrs. Emily H. Terry.* **8**: 36.
Apospory and Fern Variation in Great Britain.—*Charles T. Druery.* **5**: 56.
Ash of Phegopteris Hexagonoptera, The. **5**: 56.
Aspidium cristatum, Notes on.—*C. E. Waters.* 1-1.
Aspidium cristatum x marginale.—*Geo. E. Davenport.* **4**: 40.
Aspidium mohrioides, Facts Concerning.—*T. S. Brandagee.* **7**: 42.
Aspidium spinulosum and Its Varieties.—*James A. Graves.* 4-1.
Asplenium Bradleyi.—*C. E. Waters.* **5**: 21.
Asplenium ebeneum, Fragrance of.—*Margaret Slosson.* **9**: 19.
Asplenium ebenoides, A Correction. **7**: 95.
Asplenium ebenoides, New Form of.—*C. E. Waters.* **10**: 1.
Asplenium ebenoides, New Station for.—*G. A. Woolson.* **9**: 89.
Asplenium ebenoides in Havana Glen, Ala.—*L. M. Underwood.* **5**: 14.
Asplenium ebenoides in Virginia.—*W. Alphonso Murrill.* **5**: 1.
Asplenium fontanum.—*Willard N. Clute.* **5**: 45.
Asplenium fontanum in The West.—*B. D. Gilbert.* **6**: 4.
Asplenium montanum.—*C. F. Saunders.* **5**: 26.
Asplenium montanum, Connecticut Stations for.—*C. B. Graves.* **8**: 18.
Asplenium, New Species of.—*B. D. Gilbert.* **9**: 53.
Asplenium pinnatifidum.—*C. F. Saunders.* 11-3.
Asplenium pinnatifidum, New Locality for.—*William Palmer.* **7**: 70.

Asplenium viride, Extension of Range for.—*Willard N. Clute.* **7**: 37.
As to Varieties. Editorial. **8**: 92.

B

Bimorphic Ferns, Fruiting of.—*A. A. Eaton.* **4**: 50.
Binding the Bulletin. **8**: 88.
Birth of a Fern, The.—*Charles T. Druery.* **7**: 39.
Blue Prints. *C. E. Waters.* 12-2.
Book News. **7**: 18, 47, 74, 102. **8**: 23, 46, 70, 94. **9**: 21, 46, 69, 94.
Books on Ferns.—*George G. Hinsdale.* 1-6.
Botanical Courses. 10-11.
Botrychium, A New Species of.—*A. A. Eaton.* **7**: 7.
Botrychium biternatum.—*L. M. Underwood.* **5**: 30.
Botrychium from Jamaica, A New.—*L. M. Underwood.* **8**: 59.
Botrychium matricariaefolium.—*Geo. E. Davenport.* **9**: 37.
Botrychium simplex.—*A. A. Eaton.* **8**: 19.
Botrychiums in an Odd Place.—*Frances Zirngiebel.* **6**: 9.
Botrychium tenebrosum, Specific Characters in.—*A. A. Eaton.* **10**: 54.
Botrychium ternatum.—*A. A. Eaton.* **5**: 66.
Botrychium ternatum and Its Varieties.—*Geo. E. Davenport.* **5**: 40, 50.
Botrychium ternatum and Obliquum.—*Willard N. Clute.* **10**: 76.
Botrychium ternatum, Revision of the Species as Proposed by Dr. Underwood. Editorial. **7**: 17.
Botrychium ternatum, Varieties of.—*L. M. Underwood.* **5**: 28.
Botrychium Virginianum, Local Name for.—*S. F. Price.* **8**: 91.
Boulder Fern, A New Form of.—*Willard N. Clute.* **10**: 87.
Boulder Fern, The, or Fine-Haired Mountain Fern.—*W. R. Maxon.* **7**: 94.
Bracken in British Columbia, The.—*Dr. Fletcher.* **5**: 57.
Brachythecium cyrtophyllum. **6**: 66.
British Fern Culture.—*Charles T. Druery.* **10**: 107.
British View, A. Editorial. **8**: 68.
Bryological Memorial Meeting at Columbus, Ohio. **7**: 77.
Bryologist, The. **6**: 37, 61, 85. **7**: 21, 49, 77, 105.
Bryoziphium Norvegicum.—*Mrs. E. G. Britton.* **6**: 12.
Bulblets of Lycopodium lucidulum.—*C. E. Waters.* **6**: 24.

C

California Fern Gossip.—*S. B. Parish.* **9**: 73.
Camptosorus rhizophyllus.—*Elmira E. Noyes.* 7-1.

Camptosor~~p~~us Sibirica.—*Willard N. Clute.* **6**: 75.
Catherinaeas, The.—*A. J. Grout.* **6**: 63.
Changed Conception of Species, A.—*L. M. Underwood.* **9**: 49.
Changes in Nomenclature.—*Willard N. Clute.* 4-5.
Chapter Election. **4**: 10, 68.
Chapter Ferns. **4**: 10, 26, 67. **5**: 16, 32, 48, 68. **6**: 77. **7**: 19, 48. **10**: 118.
Chapter Notes, Fern. 12-8.
Cheilanthes, A New.—*A. A. Eaton.* **5**: 43.
Cheilanthes lanosa.—*H. A. Green.* **6**: 27.
Cheilanthes lanosa.—*W. A. Murrill.* **5**: 62.
Cheilanthes lanosa at New Haven, Conn.—*Gilbert Van Ingen.* **9**: 7.
Christmas Fern, The.—*Willard N. Clute.* **9**: 11, 63.
Climbing Fern, The.—*W. R. Maxon.* **8**: 8.
Climbing Fern in Spring, The.—*C. F. Saunders.* **9**: 30.
Clute, Willard Nelson. **10**: 122.
Coiling Frond, A.—*Willard N. Clute.* **4**: 37.
Collecting Ferns.—*A. May Walter.* 1-5.
Color in Young Fern Fronds.—*C. F. Saunders.* **9**: 5.
Common Names. Editorial. **7**: 72. **8**: 44.
Common Polypody, The.—*C. F. Saunders.* **5**: 63.
Concerning Nomenclature. Editorial. **8**: 45.
Connecticut Stations for Asplenium montanum.—*C. B. Graves.* **8**: 18.
Constitution of The Linnaean Fern Chapter. 5-1.
Cord-moss and Its Allies, The.—*A. J. Grout.* **7**: 52.
Correction, A.—*Charles L. Williams.* 1-8.
Correction, A. **7**: 27.
Correction, A.—*L. M. Underwood.* **10**: 27. *Geo. E. Davenport.* **10**: 59.
Correction Corrected, A.—*Charles L. Williams.* 4-6.
Cosmopolitan Ferns. 12-8.
Cost of The Fern List. 10-10.
Creeping Selaginella, The.—*Willard N. Clute.* **5**: 60.
Cryptogramme acrostichoides.—*J. B. Flett.* **7**: 36.
Cultivation of Ferns.—*F. H. Horsford.* **4**: 46.
Curtiss, George Franklin. **4**: 27.
Cystopteris, A New Form of.—*Willard N. Clute.* **9**: 64.
Cystopteris fragilis. Editorial. **7**: 72.

D

Davenport, George E. Editorial. **9**: 44.
Development of Ferns from Spores. **6**: 8.
Dicksonia, A Variety of.—*William R. Maxon.* **7**: 63.
Dicranums, The.—*A. J. Grout.* **6**: 86. **7**: 23.
Differences in Fern Stems.—*C. E. Waters.* **5**: 58.
Dimorphic Ferns.—*Geo. F. Atkinson.* **4**: 33.
Distribution of The Rue Spleenwort in Ohio.—*W. A. Kellerman.* **7**: 96.
Dorset Ferns.—*Mrs. Emily H. Terry.* **6**: 7.
Dryopteris (?).—*Charles T. Druery.* **8**: 41.
Dryopteris acrostichoides, Freaks of.—*Emily C. Anthony.* **9**: 19.
Dryopteris Boottii, Maryland Localities of.—*C. E. Waters.* **9**: 92.
Dryopteris cristata x marginalis.—*Margaret Slosson.* **7**: 5.
Dryopteris from Jamaica, A New.—*Willard N. Clute.* **8**: 67.
Dryopteris marginalis, A Freak of.—*Mrs. E. C. Anthony.* **8**: 69.
Dryopteris marginalis, The Spores of. **5**: 8.
Dryopteris munita, A New Variety of.—*A. A. Eaton.* **9**: 7.
Dryopteris Noveboracensis without Indusium.—*B. D. Gilbert.* **7**: 3.
Dryopteris simulata.—*A. A. Eaton,* **5**: 13.
Dryopteris simulata in Central New York.—*H. D. House.* **9**: 84.
Dryopteris simulata in Maryland.—*C. E. Waters.* **4**: 38. **5**: 11.
Dryopteris simulata in New York State.—*Willard N. Clute.* **7**: 91.
Dryopteris simulata in Pennsylvania.—*C. F. Saunders.* **8**: 14.
Dryopteris vs. Lastraea.—*Charles T. Druery.* **8**: 87.

E

Earliest Fern, The.—*A. A. Eaton.* **9**: 91. *E. J. Hill.* **10**: 78.
Early Fern Study in America.—*George E. Davenport.* **10**: 97.
Early Fruiting Fronds. Editorial. **7**: 72.
Eaton, Alvah Augustus.—*W. N. C.* **10**: 52.
Eaton, Daniel Cady.—*William Albert Setchell.* **8**: 49.
Editorial. 11-11, 12-10. **4**: 29. **5**: 17, 33, 49, 69. **6**: 13, 33, 57, 81. **7**: 16, 43, 72, 100. **8**: 20, 44, 68, 92. **9**: 20, 44, 68, 93. **10**: 28, 60, 92, 124.
Election Notice. **5**: 68.
Election of Officers. 2-7.
Equisetum, A New.—*Alvah A. Eaton.* **10**: 120.
Equisetum hiemale.—*C. E. Waters.* 6-1.
Equisetum palustre, Southern Range of.—*Frank E. McDonald.* **8**: 34.
Equisetum scirpoides, Notes on.—*A. J. Grout.* **6**: 24.

Equisetums, Identifying. **5**: 10.

Equisetum, The Genus in America.—*A. A. Eaton.* **6**: 45, 69. **7**: 57, 85. **8**: 75. **9**: 3, 33, 61, 81. **10**: 43, 71.

Evergreen Ferns.—*C. E. Waters.* **4**: 5.

"Every Day" Plants.—*C. F. Saunders.* **5**: 65.

Exchanges and Wants. 3-11, 5-12. **4**: 32, 51, 69.

Explanation, An. 6-6.

Fairy Rings Formed by Lycopodium inundatum.—*B. L. Robinson.* **7**: 68.

Fairy Rings Formed by Osmunda.—*Willard N. Clute.* **9**: 86.

F

Fall Fruiting of Osmunda.—*W. C. Steele.* **10**: 19.

False Trinomialism.—*William Palmer.* **9**: 13.

Fern Book Offer, A.—*L. M. Underwood.* 3-6.

Fern Collecting.—*Willard N. Clute.* 10-1.

Fern Collections. Editorial. **7**: 100.

Fern Enemy, A.—*Sadie F. Price.* **8**: 86.

Fernery, The. 7-4.

Fern Garden, The. **4**: 23.

Fern Hunting in Nassau.—*Mrs. E. C. Anthony.* **10**: 65.

Fern List Again, The. 8-3, 10-9.

Fern Localities.—*C. E. Waters.* 3-3.

Fern Locality, A Rich.—*Margaret Slosson.* **6**: 51.

Fern New to the United States, A.—*B. D. Gilbert.* **7**: 10.

Fern Prothalli.—*C. F. Saunders.* **4**: 64.

Fern Prothallium, The. Editorial. **8**: 21.

Ferns and Allies at Unalaska and Nome City.—*J. B. Flett.* **9**: 31.

Ferns and Orchids. 12-7.

Ferns for Sale. **4**: 15.

Ferns for Winter. 7-3.

Ferns Free. 10-8, 11-8, 12-6. **4**: 49.

Ferns from Spores.—*H. D. Hutchinson.* 11-7.

Ferns Given Away. 8-4.

Ferns in Jamaica.—*George F. Curtiss.* 11-1.

Ferns in The New Jersey Pine Barrens.—*C. F. Saunders.* **6**: 21.

Ferns of Mt. Toby.—*A. T. Beals.* **4**: 1.

Ferns of Scolopendrium Lake, The.—*L. M. Underwood.* **5**: 53.

Ferns of Southeastern Ohio.—*Mrs. J. D. Taylor.* **8**: 78.

Ferns of Susquehanna, Pa.—*James A. Graves.* 2-1.

Ferns Out of Place.—*Willard N. Clute.* **7**: 95.
Fern Spores and Other Notes.—*Mrs. M. L. Stevens.* 1-4.
Fern Stems.—*C. E. Waters.* **7**: 92.
Fern Study in Great Britain.—*Charles T. Druery.* **6**: 26.
Ferns Wanted for The Agassiz Association. 6-4.
Fern Variation. **7**: 12.
Fern Variation in Great Britain.—*Raynal Dodge.* **6**: 31.
Fern Varieties. Editorial. **7**: 45.
Fertility of The Fern Tribe.—*Charles T. Druery.* **7**: 99.
Field Horsetail, The.—*C. F. Saunders.* **7**: 31.
First Frond, The. Editorial. **7**: 43.
First Meeting of The Chaper, The.—*Willard N. Clute.* **6**: 79.
Flowering Ferns, The. **9**: 38.
For Exchange. 11-9.
Forking Botrychia.—*A. A. Eaton* and *W. N. Clute.* **5**: 66.
Forking Fronds.—*C. E. Waters.* 2-5. *Geo. G. Hinsdale.* 3-5, 6-2. **4**: 7, 25, 66. **5**: 14, 47, 64.
Fragrant Shield Fern, The.—*James A. Bates.* **4**: 2.
Frond, Lamina, Stipe. **5**: 34.
Four New Species of Ophioglossum.—*Mrs. E. G. Britton.* **6**: 1.
Future Fern Study. Editorial. **7**: 43.

G

Gemmae of Lycopodium, The. **5**: 58.
Genera in Aspidieae, The.—*L. M. Underwood.* **10**: 84.
Generic and Specific Names.—*B. D. Gilbert.* **9**: 90.
Genus Equisetum, The. With Reference to N. A. Species. (See Equisetum).
Geographical Distribution of Dicrana.—*Rodney H. True.* **7**: 25.
Georgia Ferns.—*B. D. Gilbert.* **10**: 74.
Get It in Your Eye.—*A. A. Eaton.* **5**: 29.
Gilbert, B. D. Editorial. **9**: 66.
Goldie, John.—*Willard N. Clute.* **8**: 73.
Grape Ferns of Mt. Ararat.—*C. F. Saunders.* **8**: 82.
Grimmia Mollis in the United States.—*John M. Holzinger.* **7**: 27.
Growing Ferns, New Way of.—*Willard N. Clute.* **9**: 91.
Growing Periods of Southern California Ferns, The.—*S. B. Parish.* **8**: 26.

H

Hair-Cap Mosses, The.—*A. J. Grout.* **6**: 18.
Hart's-Tongue Fern, A New Station for.—*Frances T. Parsons.* **6**: 74.
Hart's-Tongue Fern, Tennessee Locality for the.—*James H. Ferriss.* **7**: 98.
Hart's-Tongue, Young, at Green Lake.—*W. R. Maxon.* **7**: 1.
Heater for Glycerine Jelly Slides.—*J. Franklin Collins.* **7**: 21.
Helps for the Beginner.—*Willard N. Clute.* **6**: 28, 52, 76. **8**: 56, 81. **9**: 11, 38, 57. **10**: 16, 47, 79.
Historical Sketch of The Linnaean Fern Chapter.—*B. D. Gilbert.* **10**: 116.
Hog-Brake, Name for Pteris aquilina.—*Mrs. Stephen Knowlton.* **8**: 39.
How I Found Dryopteris simulata.—*Raynal Dodge.* **4**: 35.
How I Found Schizaea pusilla.—*Elizabeth G. Britton.* **4**: 1.
How to Collect Mosses.—*A. J. Grout.* **6**: 62.
How to Dry Equisetums.—*A. A. Eaton.* **5**: 66.
How to Identify The Shield Ferns.—*Willard N. Clute.* **7**: 61.
Hulst, Rev. George D. Obituary. **9**: 24.
Hybrid Ferns. Editorial. **7**: 44.

I

Identifying Equisetums. **5**: 10.
Illustrated Glossary of Bryological Terms.—*A. J. Grout.* **7**: 82, 110.
Index to Current Literature Relating to Ferns. **10**: 31, 63, 88, 127.
Insect Damages.—*Charles T. Druery.* **8**: 42.
Interesting Japanese Polypody, An.—*W. R. Maxon.* **10**: 42.
In the Haunts of the Hart's Tongue.—*Willard N. Clute.* **5**: 54.
Iowa Ferns.—*Mary E. Carr.* 3-5.
Isoetes, A New.—*A. A. Eaton.* **6**: 5.
Isoetes, A New Variety of.—*A. A. Eaton.* **8**: 60.
Isoetes Dodgei—A New Station.—*T. Chalkley Palmer.* **8**: 6.
Isoetes Howellii and I. Nuttallii.—*A. A. Eaton.* **8**: 32.
Isoetes minima.—*A. A. Eaton.* **6**: 30.

J

Jamaica, The Fern Lover's Paradise.—*B. D. Gilbert.* **5**: 37.
Japanese Polypody, An Interesting.—*W. R. Maxon.* **10**: 42.

K

Key to the Mniums of Northeastern America.—*A. J. Grout.* **7**: 105.

L

Linnaean Fern Chapter. **4**: 8, 25, 49, 67. **5**: 15, 31, 48, 67. **6**: 11, 32, 55, 77. **7**: 19, 48, 76, 104. **8**: 24, 47, 72, 96. **9**: 24, 48, 72, 95. **10**: 32, 64, 96, 128.
Literary Notes. 12-11.
List, A New Fern. 6-3, 7-4, 8-3. No. 9 entire.
List of the Fernworts Collected in Jamaica.—*Willard N. Clute.* **8**: 64, 89. **9**: 16, 43, 67. **10**: 26, 89.
Locality for Cheilanthes Lanosa, A.—*Newlin Williams.* **4**: 59.
Log Fern, The.—*William Palmer.* **10**: 37.
Lomaria Spicant, called "Deer Fern."—*J. B. Flett.* **10**: 25.
Lycopodium Alopecuroides.—*George E. Davenport.* **7**: 97.
Lycopodium Alopecuroides in Massachusetts.—*Willard N. Clute.* **5**: 5.
Lycopodium, A New Form of.—*Willard N. Clute.* **9**: 8.
Lycopodium Carolinianum.—*C. F. Saunders.* **5**: 10.
Lycopodium inundatum.—*Willard N. Clute.* **8**: 85.
Lycopodium lucidulum, Bulblets of.—*C. E. Waters.* **6**: 24.
Lycopodium Selago.—*C. F. Saunders.* **5**: 6.
Lycopodium, The Gemmae of. **5**: 58.
Lygodium palmatum in New Hampshire.—*R. H. Metcalf.* **10**: 59.
Lygodium palmatum on the Market.—*W. R. Maxon.* **9**: 19.
Lygodium, The Habitat of.—*C. F. Saunders.* **8**: 33.

M

Marsilia at Night.—*C. F. Saunders.* **8**: 52.
Marsilia quadrifolia.—*Esther H. Thompson.* 11-5. *R. H. Rich.* **4**: 63. *C. W. Jenks.* **8**: 91.
Massachusetts Shield Fern. Editorial. **8**: 20.
Meehan, Thomas. Editorial. **9**: 87. Death of. **10**: 29.
Method of Distinguishing between Dryopteris simulata, D. Noveboracensis and D. Thelypteris.—*Raynal Dodge.* **4**: 65.
Microscopic Preparation of Mosses.—*E. G. Britton, J. F. Collins, A. J. Grout.* **6**: 89.
Minor Inaccuracies.—*L. M. Underwood.* **10**: 53.
Mniums, The.—*A. J. Grout.* **7**: 78.
Monographs of North American Mosses. **6**: 16.
Moss Department. **6**: 17.
Mosses for Distribution. **6**: 67, 91. **7**: 27, 55, 81, 112.
Mounting Ferns.—*Willard N. Clute.* 12-4.
Mount Mansfield, Ferns on.—*James A. Bates.* **6**: 31.

My Fernery.—*C. Antoinette Shepard.* **4**: 22.

N

Naturalization of Exotic Ferns.—*Willard N. Clute.* **6**: 10.
Nebraska Ferns and Fern Allies.—*R. Kent Beattie.* **6**: 72.
Neglected Feature, A. Editorial. **7**: 44.
Nephrodium Thelypteris, A New Form of.—*A. A. Eaton.* **10**: 78.
Nephrolepis, Tubers of.—*J. Birkenhead.* **7**: 12, 35.
New American Mosses. **6**: 43, 67, 91. **7**: 84.
New Botrychium from Jamaica, A.—*L. M. Underwood.* **8**: 59.
New Cheilanthes of the Section Adiantopsis.—*A. A. Eaton.* **5**: 43.
New Dryopteris from Jamaica, A.—*Willard N. Clute.* **8**: 67.
New Equisetum, A.—*A. A. Eaton.* **10**: 120.
New Fern, A. 10-10.
New Fern List, A. 6-3, 7-4.
New Form of Boulder Fern, A.—*Willard N. Clute.* **10**: 87.
New Isoetes, A.—*A. A. Eaton.* **6**: 5.
New Locality for Asplenium pinnatifidum, A.—*William Palmer.* **7**: 70.
New Members. **5**: 68.
New Moss Chapter, The. **6**: 85.
New or Rare Mosses. **6**: 41, 66.
New Plan of Study, A. **6**: 32.
New Quillwort from Mexico, A.—*A. A. Eaton.* **5**: 25.
New Species of Botrychium, A.—*A. A. Eaton.* **7**: 7.
New Species of Selaginella, A.—*A. A. Eaton.* **7**: 33.
New Station for the Hart's Tongue Fern, A.—*Frances T. Parsons.* **6**: 74.
New Variety of Isoetes, A.—*A. A. Eaton.* **8**: 60.
New Way of Growing Ferns.—*Willard N. Clute.* **9**: 91.
New Way to Obtain Sporelings.—*Mrs. E. C. Anthony.* **10**: 84.
New Zealand Ferns and Fern Study.—*George E. Smith.* **10**: 111.
Nomenclature and Varieties.—G. **9**: 6.
Nomenclature, Concerning. Editorial. **8**: 45.
Nomenclature, Some Peculiar. Editorial. **8**: 21.
No Stability. Editorial. **9**: 68.
Note from the Treasurer. **10**: 96.
Notes. 1-11, 2-8, 3-10, 4-7, 5-10, 6-7, 7-7, 10-11. **4**: 31, 53, 71. **5**: 19, 35, 51, 71.
Notes from the South.—*Willard N. Clute.* **10**: 5, 33, 82.
Notes from Vermont.—*James A. Bates.* 3-1.
Notes on American Ferns.—*Wm. R. Maxon.* **8**: 29, 58, 84. **9**: 59. **10**: 46.

Notes on Japanese Ferns.—*Kiichi Miyake.* **10**: 114.
Notes on Some Common Ferns.—*J. C. Buchheister.* **10**: 56.
Notes on Some Rare Washington Ferns.—*J. B. Flett.* **10**: 24.
Notes on Some South Florida Ferns.—*Charles L. Pollard.* **7**: 88.
Notes on the January Fern Bulletin.—*Charles T. Druery.* **10**: 51.
Notes on the Life History of the Mosses.—*A. J. Grout.* **6**: 40.
Noteworthy American Mosses.—*J. M. Holzinger.* **7**: 80.
Notice, A. 7-6.
Notice of Election. 7-5, 12-9.

O

Obituary. Mrs. E. E. Luquer, 6-5. George F. Curtiss, **4**: 10. Mrs. Harriet N. Clute, **4**: 28. Rev. George D. Hulst, **9**: 24.
Oklahoma, Catalog of Plants of. **8**: 69.
Only One.—*Mary E. Carr.* 10-7.
Ophioglossum, Four New Species of.—*Elizabeth G. Britton.* **6**: 1.
Ophioglossums, Do They Rest for a Season?—*Joseph Crawford.* **8**: 17.
Ophioglossums Resting.—*Homer D. House.* **8**: 40.
Ophioglossums, Resting of.—*Willard N. Clute.* **9**: 12.
Ophioglossums, Two Odd.—*A. A. Eaton.* **5**: 11.
Ophioglossum vulgatum.—*A. A. Eaton.* **4**: 60. *Sadie F. Price.* **4**: 61. *E. C. Kent* and *Stewart H. Burnham.* **4**: 62.
Orchids and Ferns.—*Mrs. M. L. Stevens.* **4**: 7.
Osmunda cinnamonea, A New Form of.—*C. E. Waters.* **10**: 21.
Osmunda cinnamonea frondosa.—*C. D. McLouth.* **4**: 3. *A. A. Eaton.* **5**: 65.
Osmunda Claytoniana as a Study in Circination.—*Bessie L. Putnam.* **8**: 42.
Osmunda Claytoniana for Cultivation.—*C. E. Waters.* **6**: 55.
Ostrich Fern in Virginia, The.—*Charles L. Pollard.* **7**: 71.
Our Miscellany. **4**: 44, 65. **5**: 11, 47, 64.
Outfit for the Study of Mosses.—*A. J. Grout.* **6**: 17.

P

Parsons, Frances Theodora.—*Willard N. Clute.* **10**: 20.
Pellaea atropurpurea.—*Guy L. Stewart.* **9**: 15.
Pellaea atropurpurea, An Evergreen.—*E. J. Hill.* **10**: 82.
Pellaea atropurpurea in a Strange Place.—*A. Vincent Osmun.* **10**: 58.
Pellaea atropurpurea in Cultivation.—*F. W. Barclay.* **6**: 25.
Pellaea atropurpurea, On.—*C. E. Waters.* 5-7. *Mrs. E. C. Anthony.* **8**: 66.
Pellaea gracilis in Illinois.—*E. J. Hill.* **8**: 31.

Pennsylvania Ferns.—*Mrs. A. D. Dean.* 8-1.
Phegopteris Dryopteris.—*C. F. Saunders.* **5**: 67.
Phegopteris hexagonoptera, The Ash of. **5**: 56.
Phyllitis. **5**: 50, 54.
Pogonatums or Bearded Mosses, The.—*A. J. Grout.* **6**: 38.
Polypodies, The.—*Willard N. Clute.* 2-6. **8**: 56.
Polypodium Californicum, The Range of.—*B. D. Gilbert.* **9**: 92.
Polypodium incanum.—*Thomas Meehan.* **9**: 28.
Polypodium polypodioides.—*H. A. Green.* **5**: 11. *F. Peyton Rous.* **5**: 64.
Polypodium Scouleri, Southern Extension of The Range of.—*S. B. Parish.* **9**: 40.
Polypody, An Interesting Japanese.—*W. R. Maxon.* **10**: 42.
Polypody's Relatives, The.—*Willard N. Clute.* **4**: 42.
Polypody, The Common.—*C. F. Saunders.* **5**: 63.
Preparation of Mosses for Examination With the Compound Microscope.—*A. J. Grout.* **7**: 49.
President's Report.—*Willard N. Clute.* 3-7, 8-5. **4**: 8.
Pressing and Mounting Ferns.—*Mrs. A. D. Dean.* 1-8.
Pressing and Preserving Equiseta.—*A. A. Eaton.* **5**: 66.
Professor Underwood. Editorial. **9**: 20.
Proposed Amendment, A. 3-7.
Pteridophyta of North America. The Chapter List. No. 9.
Pteridophytes of Georgia, The.—*Roland M. Harper.* **7**: 65.
Pteris Aquilina and Its Allies in North America.—*Willard N. Clute.* **8**: 37.
Pteris Aquilina as a Vegetable.—*C. F. Saunders.* **7**: 99.
Public Fern Collection, A.—*C. F. Saunders.* 10-6.
Pursh's Journal, Frederick. Editorial. **5**: 70.

Q

Quillwort from Mexico, A New.—*A. A. Eaton.* **5**: 25.
Quillworts, The. **9**: 57.

R

Range of Polypodium Californicum, The.—*B. D. Gilbert.* **9**: 92.
Redfield, John H.—*Thomas Meehan.* **8**: 25.
Rediscovery of Schizaea pusilla in Newfoundland.—*Elizabeth G. Britton.* **4**: 62.
Relation Between the Sterile and Fertile Leaves of Dimorphic Ferns.—*Geo. F. Atkinson.* **4**: 33.

Report of Elections. 3-9, 8-8.
Resting of Ophioglossums.—*Willard N. Clute.* **9**: 12.
Resurrection Fern, The. **4**: 46. **8**: 56.
Rich Fern Locality, A.—*Margaret Slosson.* **6**: 51.
Rich Locality, A.—*William Palmer.* **9**: 18.
Rock Relations of The Walking Fern, The.—*E. J. Hill.* **9**: 55.
Rue Spleenwort Near New York, The.—*Pauline Kaufman.* **8**: 16.

S

Sandstone Habitats of Pellaea.—*Mrs. A. E. Goetting.* **10**: 85.
Santa Marta Expedition, The. **6**: 59.
Saunders, Charles Francis.—*W. N. C.* **10**: 77.
Schizaea, Another Locality for.—*Mrs. Elizabeth H. Terry.* **8**: 36.
Schizaea Locality.—*H. A. Green.* **5**: 11.
Schizaea pusilla.—*C. F. Saunders.* **10**: 41.
Schizaea pusilla at Home.—*C. F. Saunders.* **4**: 20.
Schizaea pusilla, Rediscovery of in Newfoundland.—*Elizabeth G. Britton.* **4**: 62.
Schizaea pusilla, Two New Stations for.—*Willard N. Clute.* **8**: 15.
Scolopendrium and Pellaea.—*Stewart H. Burnham.* **10**: 57.
Scolopendrium offiicinarum, vulgare and scolopendrium. Editorial. **5**: 50.
Scolopendrium Scolopendrium.—*C. F. Saunders.* 12-1.
Second Fern Meeting, A. **8**: 48.
Second Meeting of the Chapter, The. **8**: 72.
Secretary's Report. *Mrs. T. D. Dershimer.* 3-9, 4-4, 8-8. *C. E. Waters.* **4**: 9.
Selaginella, A New Species of.—*A. A. Eaton.* **7**: 33.
Sellaginellae of North America.—*L. M. Underwood.* **10**: 8.
Sellaginella, The Creeping.—*Willard N. Clute.* **5**: 60.
Sensitive Fern, The.—*Willard N. Clute.* **5**: 59. **8**: 81.
Sensitiveness of Ferns to Environment.—*G. A. Woolson.* **7**: 13.
Sequence of the Cinnamon Fern's Fronds, The.—*Willard N. Clute.* **7**: 97.
Shield Fern, The Fragrant.—*James A. Bates.* **4**: 2.
Slender Cliff-Brake on Sandstone, The.—*Ellison Orr.* **10**: 56.
Some Additional Notes on the Methods of Microscopical Examination of Mosses.—*J. M. Holzinger.* **7**: 107.
Some California Ferns.—*Mrs. Julia E. Campbell.* **5**: 62.
Some Common Ferns.—*J. H. Lemon.* 2-3.
Some Features of Future Fern Study.—*Lucien M. Underwood.* **10**: 105.

Some Ferns of the Sierra Nevada Range.—*W. G. Watkins.* **10**: 68.
Some Hitherto Unnoted Variations of Familiar Ferns.—*B. D. Gilbert.* **8**: 9.
Some North American Pteridophytes.—*B. D. Gilbert.* **10**: 12.
Some Peculiar Nomenclature. Editorial. **8**: 21.
Some Rare Vermont Ferns.—*W. W. Eggleston.* **7**: 4.
Some Roadside Ferns of Herkimer Co., N. Y.—*H. D. House.* **10**: 14.
Some Variations in the Adder's Tongue.—*Wm. R. Maxon.* **7**: 90.
Some Washington Ferns.—*J. B. Flett.* **8**: 40.
Southern Extension of the Range of Polypodium Scouleri.—*S. B. Parish.* **9**: 40.
Southern Range of Equisetum palustre.—*Frank E. McDonald.* **8**: 34.
Spiny Shield Fern in Alaska, The.—*M. W. Gorman.* **5**: 9.
Spore-Bearing Area of Fertile Fronds, The.—*B. D. Halstead.* **7**: 69.
Spores of Dryopteris marginalis, The. **5**: 8.
Spores, The Number of.—*R. W. Smith.* **8**: 66.
Story of a Fern Hunt, The.—*George D. Hulst.* **9**: 1.
Suggestion for Study, A.—*B. D. Gilbert.* **7**: 37.
Sullivant Moss Chapter, The. **7**: 28, 56, 112.

T

Tennessee Locality for the Hart's-Tongue Fern, The.—*James H. Ferriss.* **7**: 98.
Ten Years Retrospect, A.—*Willard N. Clute.* **10**: 101.
Ternate Botrychia in Central New York, The.—*B. D. Gilbert.* **9**: 25.
To Lovers of Ferns. 5-6.
Traveling Ferns.—*Willard N. Clute.* 1-9.
Treasurer's Report.—*Reuben M. Strong.* 3-8. *James A. Graves.* 8-7. **4**: 9.
Trichomanes peltatum in Japan.—*K. Miyake.* **7**: 59.
Trichomanes Petersii.—*L. M. Underwood.* **5**: 63.
Trichomanes radicans.—*Sadie F. Price.* **4**: 59.
Twin Species? Editorial. **8**: 44.
Two Fern Allies in Central New York.—*J. V. Haberer.* **9**: 88.
Two New Fern Lists.—*George E. Davenport.* **9**: 77. **10**: 22.
Two New Ferns from Jamaica.—*B. D. Gilbert.* **8**: 62.
Two New Isoetes.—*A. A. Eaton.* **8**: 12.
Two New Stations for Schizaea pusilla.—*Willard N. Clute.* **8**: 15.
Two Odd Ophioglossums.—*A. A. Eaton.* **5**: 11.
Tubers of Nephrolepis.—*J. Birkenhead.* **7**: 12, 35.
Turkey-Foot Fern, The. **7**: 11.

Turkey-Foot Fern Again, The.—*Jas. A. Graves* and *Mrs. Stephen Knowlton.* 7: 39.

U

Underwood, Dr. Lucien Marcus. Editorial. 9: 20.

V

Variation in Polypodium vulgare.—*Mrs. E. G. Britton.* 7: 34.
Variations in Asplenium. 4: 19.
Varieties of Botrychium ternatum, The.—*L. M. Underwood.* 5: 28.
Variety of Dicksonia, A.—*Wm. R. Maxon.* 7: 63.
Veining in the Marsh Shield Fern and Others.—*Willard N. Clute.* 7: 67.
Vermont Ferns.—*A. J. Grout.* 5-9, 10-4.

W

Walking Fern, The.—*Charles L. Williams.* 8-2.
Washington Ferns, Notes on Some Rare.—*J. B. Flett.* 10: 24.
What Are Mosses?—*A. J. Grout* and *Marie L. Sanial.* 7: 51.
What the Chapter Is. 4: 25.
Why Dryopteris and not Lastraea.—*L. M. Underwood.* 8: 52.
Willard Nelson Clute. Editorial. 10: 122.
Williamson, John.—*George E. Davenport.* 8: 1.
Williamson's Fern Etchings. 8: 35.
Wind-Blown Ferneries.—*George E. Davenport.* 5: 24.
Winter Ferns.—*C. F. Saunders.* 4: 6.
Wonders of Spore Production.—*Charles T. Druery.* 8: 43.
Woodsia alpina.—*W. W. Eggleston.* 8: 5.
Woodsia Ilvensis.—*C. F. Saunders.* 6: 3.
Woodsia obtusa and Cystopteris fragilis.—*James A. Bates.* 8: 19.
Woodsia scopulina. 4: 12.
Woodwardia areolata.—*C. F. Saunders.* 4: 40.
Woodwardia radicans, An Extension of Range for.—*J. B. Flett.* 7: 9.
Woodwardia Virginica.—*C. D. McLouth.* 4: 22.
World Distribution of Some American Ferns.—*C. F. Saunders.* 6: 49.
Wyoming Pteridophytes.—*Elias Nelson.* 7: 29.

Y

Young Hart's-Tongues at Green Lake.—*Will. R. Maxon.* 7: 1.

LIST OF SPECIES

- Acrostichum
  - aureum, 2-2. 11-2. **7**: 10, 41, 89, **8**: 90. **10**: 66.
  - lomarioides, **7**: 11, 41, 88.
- Adiantum
  - amabile, **7**: 36.
  - capillus-veneris, **4**: 64. **5**: 13. **7**: 14, 65, 99. **8**: 4, 27, 46, 94. **10**: 37, 67, 84.
  - cristatum, **5**: 39. **9**: 17.
  - cuneatum, 2-8. 11-8. **9**: 18.
  - diaphanum, **7**: 36.
  - emarginatum, **4**: 15. **8**: 27. **10**: 68, 70.
  - fragile, 10-11.
  - melanoleucum, **10**: 66.
  - modestum, **9**: 45.
  - pedatum, 1-11. 2-3. **4**: 5. **5**: 1. **6**: 72. **7**: 43, 66. **8**: 40, 79. **9**: 5, 92. **10**: 68.
  - striatum, **5**: 39.
  - tenerum, 8-5. **9**: 17. **10**: 66.
  - trapeziforme, **4**: 44. **9**: 17.
- Alsophila
  - armata, **5**: 38.
- Anemia
  - adiantifolia, **5**: 39. **7**: 90. **8**: 90. **10**: 65, 66.
- Aspidium
  - acrostichoides, 2-4. 7-3. **4**: 5, 6. **7**: 15.
  - acrostichoides incisum, 3-2. 5-9.
  - aculeatum, **8**: 27, 64.
  - aculeatum scopulinum, **8**: 27.
  - Boottii, 1-4. 4-1, 3.
  - Braunii, 5-9.
  - cristatum, 1-3, 4. 2-3. 7-3. **4**: 5. **6**: 73.
  - cristatum x marginale, **4**: 40.
  - filix-mas, **8**: 90.
  - fragrans, 5-9, 11. **6**: 31. **9**: 45.
  - juglandifolium, **7**: 73.
  - lonchitis, **8**: 30.
  - marginale, 5-10. 7-3. **4**: 6. **5**: 24. **6**: 31.
  - mohrioides, **7**: 42.
  - munitum, **8**: 27. **10**: 69.
  - Nevadense, **10**: 69.
  - Noveboracense, 3-4.
  - rigidum, **8**: 27. **10**: 69, 70.
  - rigidum argutum, **8**: 27.
  - simulatum, **9**: 29.
  - spinulosum, 4-1, 2. 7-3. **5**: 24. **6**: 73. **10**: 99.
  - spinulosum dilatatum, 3-4. 4-3. **5**: 9. **9**: 79.
  - spinulosum intermedium, 1-8. 3-4. 4-3.
  - thelypteris, **6**: 73.
  - trifoliatum, **9**: 72. **10**: 65, 66, 90.
- Asplenium
  - acrostichoides, 4-6. **4**: 5, 66. **5**: 12, 15, 58, 59. **7**: 93. **8**: 9. **9**: 60.
  - adiantum-nigrum, **9**: 56.
  - adulterinum, **9**: 56.
  - anceps, **10**: 12.
  - angustifolium, 6-2. 10-5. **4**: 1, 7. **5**: 12, 59. **7**: 93. **8**: 61, 80.
  - Bradleyi, 6-7. 11-4. **4**: 32, 48. **5**: 14, 21, 22, 47, 70. **7**: 9, 44, 93.
  - Clutei, **8**: 62. **10**: 26.
  - cyclosorum, **9**: 31, 32.
  - dentatum, **8**: 63. **9**: 26, 71. **10**: 26, 67.
  - ebeneum, 4-6. **4**: 5, 45. **5**: 24. **7**: 95. **8**: 79. **9**: 19, 90. **10**: 1, 4, 60, 75, 126.
  - ebeneum Hortonae, **9**: 44, 58, 90.
  - ebenoides, 11-4. **5**: 1, 2, 11, 13, 14, 18, 34, 65. **7**: 4, 44, 95, 102. **9**: 21, 89. **10**: 1, 2, 3, 47, 53, 60, 103, 126.
  - exiguum, **7**: 46.
  - filix-foemina, 1-4. 2-5. 10-5. 12-8. **4**: 7, 38, 39. **5**: 24, 56, 59. **6**: 27, 31, 52, 73. **7**: 30, 37, 43, 65, 74,

92, 93, 95. **8**: 27, 80, 86. **9**: 6, 10 (Eng. var's). **10**: 16, 105.

filix-foemina Victoriae, **6**: 27. **7**: 99.

filix-foemina rubellum, **10**: 75.

fontanum, 12-8. **5**: 45. **6**: 4. **7**: 96.

Glenniei, **6**: 5. **7**: 46.

Halleri, **5**: 47.

Kamchatkanum, **9**: 54.

monanthemum, **9**: 67.

montanum, 2-5. 3-4. 10-8. 11-4. **4**: 7. **5**: 21, 26, 34. **7**: 93, 96, 99. **8**: 18.

myriophyllum, **10**: 26.

parvulum, **4**: 66. **9**: 67. **10**: 46.

pinnatifidum, 11-3, 4, 8. **4**: 32. **5**: 1, 2, 14, 65, 67. **6**: 12. **7**: 70, 98. **10**: 2, 4.

platyneuron, 4-6. **4**: 6, 45. **5**: 1, 2, 14. **7**: 4, 65, 93, 95. **10**: 1, 105.

resiliens, **10**: 46.

ruta-muraria, 3-3. 12-8. **5**: 1, 13. **6**: 31, 36. **7**: 4, 96. **8**: 17.

serpentini, **9**: 56.

serratum, **9**: 67.

Trichomanes, 2-5. 3-3. 10-11. 12-8. **4**: 5, 7, 19, 25, 66. **5**: 1, 24. **7**: 12, 37. **8**: 17, 80. **9**: 10 (Eng. var's), 19. **10**: 15.

Trichomanes incisum, 5-10. **4**: 30. **6**: 54. **7**: 4, 12. **8**: 27, 69. **10**: 51, 111.

thelypteroides, 4-6. **8**: 9, 80. **9**: 60.

vespertinum, **8**: 69.

viride, 5-9. 12-8. **5**: 13. **6**: 31. **7**: 30, 37, 42. **8**: 63, 94. **9**: 56.

Athyrium

acrostichoides, **9**: 60.

cyclosorum, **10**: 24.

filix-foemina, **5**: 56. **9**: 6 (10 var's). **10**: 16, 23, 51, 75 (v. rubellum).

thelypteroides, **9**: 60, 61.

Azolla

Caroliniana, **8**: 30. **10**: 6, 36.

filiculoides, **10**: 7.

Blechnum

occidentale, **5**: 39.

serrulatum, **7**: 90.

spicant, **6**: 23. **9**: 10 (var's).

Botrychium

australe, **5**: 43.

biternatum, **5**: 19, 30, 34, 41. **7**: 17.

boreale, **9**: 32.

Coulteri, **7**: 17, 30.

decompositum, **7**: 17.

dissectum, **4**: 25. **5**: 42. **6**: 9. **7**: 17, 99. **8**: 44, 46. **9**: 25, 26. **10**: 76, 104.

intermedium, **6**: 9. **7**: 17. **9**: 25, 26. **10**: 77.

Jenmani, **8**: 59, 65.

lanceolatum, **6**: 83. **7**: 96. **8**: 82, 83. **9**: 51, 52, 78. **10**: 27.

Lunaria, **6**: 83. **9**: 1. **10**: 45, 55.

lunarioides, **5**: 19, 42, 51.

matricariæ, **7**: 17.

matricariaefolium, **6**: 83. **8**: 82, 83. **9**: 37, 51, 52, 78, 79 (var. subintegra). **10**: 16, 22, 54, 55.

neglectum, **9**: 38, 52, 79. **10**: 27, 54.

obliquum, **5**: 42, 66. **6**: 9. **7**: 17, 99. **8**: 44, 46. **9**: 12, 25, 54. **10**: 16, 76, 123.

obliquum Oneidense, **9**: 25, 27, 89. **10**: 76.

occidentale, **7**: 17.

pumicola, **8**: 93. **9**: 45, 52.

rutaceum, **5**: 43. **6**: 83.

silaifolium, **7**: 17. **10**: 23.

simplex, **5**: 24. **8**: 19. **9**: 45, 52. **10**: 54, 55, 99.

tenebrosum, **7**: 8. **9**: 79. **10**: 22, 54, 55, 59.

ternatum, 10-5. **4**: 5, 70. **5**: 12, 28, 40, 50, 66. **6**: 9. 73. **7**: 15, 17 (group), 66. **8**: 83. **9**: 25, 78, 79. **10**: 23, 76.

ternatum Oneidense, **9**: 89. **10**: 76.

Virginianum, 1-5. **4**: 45, 48, 66. **5**: 35. **6**: 72. **7**: 66, 72, 99. **8**: 43, 65, 79, 82, 91. **9**: 12, 52, 78. **10**: 16, 76.

CAMPTOSORUS
rhizophyllus, 3-4. 6-2. 7-1. 8-2. 10-8. 11-4. **4**: 7, 66. **5**: 1, 2, 14. **7**: 4, 95. **8**: 17, 80. **9**: 1, 21, 55. **10**: 1, 2, 4, 15, 58, 126.
Sibiricus, **6**: 75. **7**: 17, 48.
CERATOPTERIS
thalictroides, **10**: 5, 35.
CHEILANTHES
Alabamensis, **7**: 98.
amoena, **5**: 44. **9**: 79.
Californica, **4**: 15. **5**: 43, 45, 63. **8**: 28. **9**: 79. **10**: 69.
Clevelandii, **8**: 28. **10**: 69.
Cooperae, **8**: 28.
Fendleri-myriophylla group, **9**: 75.
fibrillosa, **8**: 28. **9**: 73, 75.
gracilis, 4-6. **5**: 71. **7**: 29.
gracillima, **8**: 31, 41. **10**: 69.
lanosa, 4-6. **4**: 7, 59. **5**: 62. **6**: 27. **7**: 65, 99. **9**: 7.
lanuginosa, 4-6. **5**: 71. **6**: 73. **9**: 75.
microphylla, **9**: 43.
myriophylla, **8**: 28.
Parishii, **8**: 28. **9**: 73, 74.
vestita, 4-6. 6-2.
viscida, **8**: 28.
CRYPTOGRAMME
acrostichoides, **4**: 48. **7**: 30, 36. **8**: 27, 31, 41. **9**: 33. **10**: 25.
CYATHEA
arborea, 11-3. **5**: 38.
pubescens, **5**: 38, 39.
CYSTOPTERIS
bulbifera, 1-10. 2-3. 3-4, 5, 6. 7-3. 12-1. **4**: 7. **6**: 32. **9**: 1. **10**: 15, 57, 79.
fragilis, 2-5. 3-1, 4. 7-3. **4**: 7. **5**: 5, 24, 38. **6**: 72. **7**: 9, 29, 72. **8**: 19, 27, 43, 80. **9**: 17, 33, 91. **10**: 69, 70.
fragilis dentata, **7**: 42.
fragilis magnasora, **9**: 64. **10**: 4.
montana, **9**: 32.
DAVALLIA
aculeata, 11-2. **9**: 17.
clavata, **10**: 65, 67.
DENNSTAEDTIA
punctilobula, **7**: 63, 94.
punctilobula cristata, **7**: 63. **9**: 79.
DICKSONIA
pilosiuscula, 3-4. 6-2. **4**: 4, 7, 44, 47, 69. **5**: 24. **8**: 43, 90. **9**: 92. **10**: 15.
pilosiuscula f. schizophylla, **10**: 87.
punctilobula, 10-6. **5**: 9, 15. **7**: 30, 94. **8**: 79.
DRYOPTERIS
acrostichoides, **4**: 6, 7, 25. **6**: 29, 30. **7**: 15, 61, 65, 70, 93. **8**: 20, 43, 79. **9**: 5, 19.
acrostichoides incisa, **4**: 11. **7**: 12.
aculeata, 10-5. **4**: 15.
aquilonaris, **9**: 33, 45.
Boottii, 10-4. **4**: 25, 39. **7**: 7, 8, 63. **8**: 14. **9**: 92. **10**: 39, 41.
Braunii, 10-5. **7**: 61.
cristata, 12-8, **4**: 39. **5**: 14. **7**: 63. **8**: 14. **10**: 41.
cristata Clintoniana, **4**: 2, 66. **8**: 91. **9**: 79. **10**: 37, 41.
cristata x marginalis, **5**: 12, 14, 20. **7**: 5, 44.
filix-mas, 12-8. **4**: 15. **5**: 38. **8**: 53, 87. **9**: 10 (varieties).
Floridana, **10**: 39, 40, 41.
fragrans, **4**: 2, 44, 48, 65. **5**: 15. **7**: 4, 63. **8**: 6. **9**: 33.
Gilberti, **8**: 67.
Goldieana, 12-1. **4**: 1, 66. **5**: 71. **7**: 62. **8**: 9, 42.
Goldieana celsa, **8**: 22. **9**: 79. **10**: 38, 39, 40, 41.
lonchitis, 12-8. **4**: 31. **7**: 30, 61. **8**: 41.
marginalis, 10-5. **4**: 6, 25, 46, 66. **5**: 8. **7**: 7, 14, 62, 73, 93. **8**: 43, 69, 80. **9**: 5.
mohrioides, **4**: 15.
montana, **9**: 10 (var's), 72.
munita, **8**: 31, 40. **9**: 7.
Noveboracensis, **4**: 36, 38, 65. **5**: 13, 14. **7**: 3, 62, 69, 92. **8**: 43.

oreopteris, 9: 72.
patens, 6: 10. 7: 45. 10: 65, 66, 67.
simulata, 10-10. 4: 25, 35, 38, 52, 65. 5: 11, 13, 15, 29, 59, 65. 6: 82. 7: 8, 43, 62, 67, 91, 92. 8: 14, 20, 94. 9: 84, 92.
spinulosa, 12-8. 4: 48, 66. 5: 6. 7: 30, 63, 92, 95. 9: 32. 10: 105.
spinulosa dilatata, 4: 25. 8: 10. 9: 10 (var's), 79.
spinulosa intermedia, 4: 25, 39. 8: 14, 80. 9: 15, 80.
thelypteris, 12-8. 4: 25, 36, 38, 39, 65. 5: 11, 13. 6: 83. 7: 8, 45, 62, 67, 92. 8: 14, 43, 79.
triangulata, 11-2.
trifoliata, 11-2.
villosa, 8: 67.

EQUISETUM
arvense, 6-1. 5: 10. 6: 46, 69, 71, 72. 7: 30, 31, 43, 58. 9: 32, 62, 84. 10: 16, 48.
arvense campestre, 5: 12. 7: 31.
arvense varieties, 7: 59, 85, 86, 87, 88.
fluviatile, 4-6. 5: 10. 6: 70, 71. 9: 63, 81, 83. 10: 49, 71, 73 (var's), 74 (var.).
hiemale, 6-1. 5: 10. 6: 69. 7: 30 (var.), 57. 9: 6 (var.). 10: 16, 50, 120 (var.).
laevigatum, 4: 31. 6: 72. 7: 30, 57. 10: 50, 120.
limosum, 4-6. 6: 73. 8: 34.
litorale, 6: 70, 71. 9: 81 (var's), 89 (var's). 10: 15, 43 (var.), 44 (var's), 45 (var's), 49.
maximum, 5: 10.
Mexicanum, 9: 73.
palustre, 5: 10. 6: 70, 71. 7: 102. 8: 34. 9: 61, 63 (var's), 81. 10: 49.
pratense, 5: 10. 6: 47, 70, 71. 9: 3, 4 (var.). 10: 48.
ramosissimum, 6: 46. 7: 57. 9: 73.
robustum, 5: 13. 6: 72. 7: 30, 57, 66. 10: 36, 50.
scirpoides, 10-5. 6: 24. 7: 57. 10: 50.
silvaticum, 5: 10. 6: 47, 69, 70, 71. 9: 32, 33, 35 (var's), 36 (var's). 10: 48.
Telmateia, 6: 46, 71. 8: 75, 76 (var.), 77 (var's), 78 (var's).
variegatum, 6: 73. 7: 30, 57. 9: 32. 10: 50.

FILIX
fragilis, 10: 105.

GYMNOGRAMME
Ehrenbergiana, 4: 7.
leptophylla, 9: 13.
triangularis, 4: 15. 5: 62. 6: 32. 8: 28. 10: 70.

GYMNOPTERIS
triangularis, 10: 25.

HEMIONITIS
palmata, 11-2.

HEMITELIA
horrida, 5, 39. 9: 16.

HYMENOPHYLLUM
asplenioides, 5: 39. 8: 65.

ISOETES
Bolanderi, 7: 30. 8: 93 (Sonnei).
Butleri, 5: 26.
Dodgei, 6: 6. 8: 6, 7, 8.
Eatoni, 5: 35. 6: 5. 8: 13.
echinospora, 8: 66. 9: 58.
echinospora Boottii, 5: 29, 8: 13.
echinospora Braunii, 10-5. 5: 29. 9: 57.
Engelmanni, 5: 29. 7: 34, 67 (v. Georgiana). 8: 13, 60 (v. Caroliniana). 9: 58.
Howelli, 8: 32.
Hystrix, 5: 26.
Macounii, 8: 12.
melanopoda, 6: 73.
melanospora, 7: 66. 8: 14.
Mexicana, 5: 26.
minima, 6: 30.
Montezumae, 5: 25.
Nuttalli, 5: 26. 6: 5. 8: 32, 33.
occidentalis, 8: 93.

Orcutti, 8: 13.
riparia, 8: 6.
saccharata, 8: 7.
Suksdorfi, 8: 33.
Tuckermani, 5: 29 (v. boreale). 6: 7.
Underwoodi, 8: 32.
LASTRAEA
montana truncata, 8: 42.
pseudo-mas, 5: 56.
LOMARIA
spicant, 8: 40. 10: 25, 70.
LONCHITIS
aurita, 9: 67.
LYCOPODIUM
adpressum, 8: 86, 93. 9: 9 (v. polyclavatum), 46.
alopecuroides, 5: 3, 12. 6: 23. 7: 66, 97. 8: 16, 93. 10: 16, 18.
alpinum, 9: 32.
annotinum, 4: 48. 9: 32 (v. pungens), 46. 10: 17.
apodum, 10: 8.
Carolinianum, 5: 10. 6: 22, 23. 7: 66. 8: 16, 86. 9: 46. 10: 19.
chamaecyparissus, 8: 23. 10: 13.
clavatum, 5: 10. 9: 32. 10: 16, 17.
complanatum, 8: 23. 10: 16, 17, 64 (v. flabelliforme).
dendroideum, 4: 39.
inundatum, 10-4, 5. 4: 39. 5: 3, 29. 6: 23. 7: 68. 8: 85. 9: 85, 88. 10: 16, 19.
inundatum Bigelovii, 8-5. 4: 39. 5: 29. 6: 23. 7: 97. 8: 16.
lucidulum, 4: 30. 5: 6. 6: 24. 7: 38. 10: 16, 18.
obscurum, 6: 23. 10: 16, 17.
pinnatum, 8: 93.
porophilum, 8: 93.
rupestre, 10: 8.
sabinaefolium, 8: 93.
selago, 10-5. 4: 30. 5: 6, 14, 58. 9: 32.
sitchense, 8: 93. 9: 32.
tristachyum, 10: 13.
LYGODIUM
palmatum, 11-8. 4: 5. 6: 21. 7: 69, 71, 99. 8: 33. 9: 19, 30. 10: 59.
volubile, 8: 90.
MARSILIA
Aegyptica, 10: 125.
quadrifolia, 11-5. 4: 63. 8: 11, 52, 91. 10: 125.
uncinata, 10: 6, 35, 46.
vestita, 6: 73. 10: 6.
MATTEUCCIA
struthiopteris, 9: 68.
NEPHRODIUM
Boottii, 10: 80.
cicutarium, 5: 39.
cristatum, 10: 16, 80.
filix-mas, 10: 80.
Goldieanum, 10: 80.
marginale, 10: 16, 79, 80.
Noveboracense, 10: 15, 80, 81.
patens, 10: 91.
simulatum, 10: 80, 81.
spinulosum, 10: 81.
spinulosum dilatatum, 10: 16, 81.
spinulosum intermedium, 10: 15, 81, 83.
tetragonum, 10: 91.
thelypteris, 10: 15, 78 (v. Pufferae), 80, 81.
NEPHROLEPIS
exaltata, 5: 64. 7: 12, 35. 10: 84.
pectinata, 7: 12.
Philippinensis, 7: 35 and var. Bauseii.
rufescens f. tripinnatifida, 10: 111.
tuberosa, 7: 12, 35.
undulata, 7: 35.
NOTHOLAENA
cretacea, 8: 28.
dealbata, 6: 73.
Fendleri, 7: 29.
ferruginea, 9: 18.
Newberryi, 8: 28.
Parryi, 8: 28. 9: 75.
sinuata, 7: 30.
tenera, 7: 42. 8: 28. 9: 76.
ONOCLEA
sensibilis, 1-10. 7-3. 4: 25. 33. 5: 9, 14, 59, 65. 6: 55, 73. 7: 15, 30,

39, 45, 65. 8: 43, 79, 81. 9: 5. 10: 15.
sensibilis f. obtusilobata, 4: 33. 7: 98. 8: 11, 82. 10: 103.
struthiopteris, 1-9. 4: 33. 5: 9, 14. 6: 10, 31, 73. 7: 39, 71, 93. 8: 90.

OPHIOGLOSSUM
Alaskanum, 6: 2. 9: 78.
arenarium, 6: 1. 8: 17. 9: 78.
Californicum, 6: 2. 9: 78.
Engelmanni, 6: 2. 9: 78.
nudicaule, 6: 2. 7: 66. 9: 79.
pusillum, 6: 2.
vulgatum, 4: 60. 5: 11, 29, 47, 71. 6: 1, 2. 7: 71. 8: 17, 40. 9: 2, 12, 45, 78 (v. mucronatum). 10: 16, 104.

OSMUNDA
cinnamonea, 2-4. 4: 25, 35, 39. 5: 7, 12, 47. 6: 23, 29. 7: 12 (v. incisa), 15, 65, 91, 97. 8: 14, 43, 65. 9: 38. 10: 15, 19, 75.
cinnamonea frondosa, 4: 3, 50. 5: 65. 7: 13, 98. 9: 6.
cinnamonea glandulosa, 10: 21.
Claytoniana, 4: 50. 6: 36, 55. 7: 15, 48, 70, 72, 74, 93, 97. 8: 42, 43, 80. 9: 6, 39. 10: 15, 19, 57.
regalis, 2-4. 4: 39, 50. 5: 66. 6: 23, 73. 7: 11, 15, 41, 65, 72. 8: 14, 43. 9: 6, 39. 10: 7, 15, 19, 51, 75.

PELLAEA
andromedaefolia, 5: 62, 63. 8: 28.
atropurpurea, 3-3. 5-7. 6-2. 4: 5, 7, 65. 5: 1, 5, 6. 6: 25, 31, 55, 73, 84. 7: 4, 29. 8: 22, 66. 9: 15, 66 (f. cristata), 91. 10: 50, 57, 58, 79, 82.
atropurpurea occidentalis, 7: 30. 9: 79.
Breweri, 7: 30.
densa, 7: 30. 8: 30, 31, 85. 10: 70.
gracilis, 5-9. 4: 47. 5: 14. 8: 31. 9: 90, 91. 10: 56, 78, 85.
ornithopus, 4: 15. 5: 62. 8: 28. 10: 70.
Stelleri, 5: 59. 7: 4. 9: 1.
Wrightiana compacta, 8: 27

PHANEROPHLEBIA
auriculata, 7: 73.

PHEGOPTERIS
alpestris, 8: 41.
dryopteris, 2-4. 4: 43, 48. 5: 67. 6: 36. 8: 41. 9: 2, 33.
hexagonoptera, 4: 4, 36, 44, 66. 5: 56. 6: 30. 8: 79, 91.
phegopteris, 4-6. 4: 25, 36. 7: 95, 99. 9: 32. 10: 46.
polypodioides, 4-6. 4: 42. 8: 80. 10: 15.
reptans, 10: 67.
Robertiana, 10: 47.

PHLEBODIUM
aureum, 10: 67.

PHYLLITIS
scolopendrium, 5: 54, 70. 7: 1. 10: 57.

POLYPODIUM
aureum, 10-7. 7: 89.
Californicum, 8: 29. 9: 42, 76, 92. 10: 70.
falcatum, 8: 41. 9: 59, 60, 73. 10: 24.
hesperium, 9: 60, 77.
Hillebrandii, 4: 45.
hymenophylloides, 4: 45.
incanum, 2-7. 4-6. 8: 56. 9: 28. 10: 37.
Japonicum, 10: 42.
Nipponicum, 10: 43.
pectinatum, 6: 36.
phyllitidis, 5: 40. 7: 89. 10: 67.
plumula, 5: 40. 7: 89.
polypodioides, 4: 46. 5: 11, 64. 6: 54. 7: 66, 89.
pseudo-grammitis, 4: 45.
reptans, 5: 39.
salicifolium, 5: 39.
Scouleri, 9: 40, 60, 73.
spectrum, 4: 45.
Swartzii, 5: 40. 7: 89.
vacciniaefolium, 5: 40.
Virginianum, 10: 14.
vulgare, 1-10. 2-6. 3-1. 8-2. 4:

5, 6, 43, 48. **6**: 30. **7**: 34, 66. **8**: 41, 56, 80. **9**: 10 (foreign var's). **10**: 13, 15, 25, 43, 56, 105.
vulgare acuminatum, **10**: 13, 51.
vulgare acutum, **8**: 58.
vulgare angustum, **7**: 34.
vulgare auritum, **7**: 94.
vulgare cambricum, **7**: 34. **10**: 52.
vulgare cristatum, 6-8. **7**: 34.
vulgare deceptum, **9**: 79.
vulgare laciniatum, **10**: 13.
vulgare occidentale, **9**: 31.
vulgare oreophilum, **9**: 21.
vulgare rotundatum, **7**: 34.
vulgare serratum, **10**: 105.

POLYSTICHUM
acrostichoides, **9**: 11. **10**: 16, 105.
aculeatum, **8**: 29. **10**: 2, 25.
angulare, **5**: 56. **9**: 10 (var's). **10**: 2.
Braunii, **9**: 12.
Californicum, **10**: 25.
lobatum, **10**: 25.
lonchitis, **9**: 12, 32.
mohrioides, **8**: 29.
munitum, **8**: 30 (v. imbricans), 31. **9**: 8 (v. flabellatum). **10**: 24 (f. inciso-serratum), 25, 105.
platyphyllum, **8**: 64.
scopulinum, **8**: 29. **10**: 25.
tenue, **8**: 63. **10**: 89.

PSILOTUM
nudum, **10**: 36.

PTERIDIUM
aquilinum pubescens, **10**: 24.

PTERIS
aquilina, 1-10. 2-3. **6**: 23, 55. **7**: 30, 39, 41, 65, 89, 99. **8**: 27, 37, 39, 43, 79, 90. **9**: 5. **10**: 16, 19, 66, 75.
aquilina pseudo-caudata, **8**: 39.
caudata, **7**: 89. **8**: 38, 55. **9**: 43, 71.
cretica, 11-8. **7**: 41. **8**: 46.
esculenta, **8**: 38, 55.
lanuginosa, **5**: 57. **8**: 37, 55.
longifolia, **5**: 39. **7**: 89. **9**: 43. **10**: 33, 65, 67.
serrulata, **4**: 66. **6**: 8. **10**: 34.
tremula, **6**: 10.

SCHIZAEA
pusilla, **4**: 17, 20, 47, 62. **5**: 11. **6**: 21, 82. **8**: 15, 36. **9**: 45. **10**: 41.

SCOLOPENDRIUM
vulgare, 4-6. 6-2. 12-1, 7. **4**: 7, 31, 66. **5**: 9, 14, 56, 61, 65. **6**: 31. **7**: 70, 98. **9**: 1, (10 var's). **10**: 57, 99, 111 (crispum).

SELAGINELLA
apus, **5**: 60. **7**: 66. **8**: 43, 46. **10**: 16, 82, 83.
arenicola, **7**: 46. **10**: 9, 84.
Aschenbornii, **10**: 11.
Bigelovii, **7**: 34, 46. **10**: 9.
Bolanderi, **10**: 11.
Bourgeaui, **10**: 10.
Chrismari, **10**: 9.
cinerascens, **7**: 33. **10**: 9, 10.
Engelmanni, **10**: 10.
extensa, **7**: 46. **10**: 12.
Fendleri, **7**: 46. **9**: 50.
Hanseni, **10**: 12.
Haydeni, **10**: 10.
Ludoviciana, **10**: 82.
montaniensis, **10**: 10.
mutica, **7**: 34, 46. **10**: 10.
oregana, **7**: 46. **10**: 8.
rupestris, **5**: 60. **7**: 30, 33, 45. **8**: 31. **9**: 50. **10**: 8, 9, 10.
rupincola, **7**: 46. **10**: 9.
Sartorii, **10**: 11.
selaginoides, **5**: 60.
Schmidtii, **10**: 10.
struthioloides, **7**: 46. **10**: 12, 25.
tortipila, **7**: 46. **10**: 9.
Underwoodii, **10**: 11.
Wallacei, **10**: 10.
Watsoni, **7**: 46. **10**: 10.
Wightii, **10**: 11, 53.

STRUTHIOPTERIS
Germanica, 2-4. **4**: 34. **9**: 68. **10**: 15.

TAENITIS
lanceolata, **7**: 90. **10**: 67.

TECTARIA
trifoliata, **9**: 72.

TRICHOMANES
Boschianum, **10**: 125.
peltatum, **7**: 59.

  Petersii, **5**: 63. **8**: 84.
  radicans, **4**: 32, 57, 66. **8**: 89. **10**: 125.
  trichoideum, **5**: 39. **8**: 89.
Vittaria
  lineata, **5**: 64. **7**: 89. **10**: 36.
Woodsia
  alpina, 4-6. **7**: 4, 76. **8**: 5, 6.
  glabella, 3-2. 5-9. **7**: 4. **8**: 5. **9**: 33.
  hyperborea, 4-6. 5-9.
  Ilvensis, 3-4. 5-9. 10-5, 8. **4**: 25. **6**: 3. **8**: 6. **9**: 33.
  obtusa, 3-1, 4, 6. 10-7. **4**: 5, 6. **5**: 1, 24. **6**: 36, 73, **7**: 65. **8**: 19. **9**: 55. **10**: 83, 105.
  Oregana, **6**: 73. **7**: 29. **8**: 27.
  scopulina, **4**: 12. **7**: 29.
Woodwardia
  angustifolia, 2-6. 4-6. **4**: 39. **7**: 71, 91. **10**: 75.
  areolata, 4-6. **4**: 40. **5**: 9, 12, 29. **6**: 22, 82. **7**: 42, 65, 69. **9**: 5.
  radicans, **4**: 15. **7**: 9. **8**: 27, 40, 69, 94. **9**: 86. **10**: 70.
  spinulosa, **9**: 86.
  Virginica, 3-2. 5-9. 6-7. **4**: 22, 39, 41. **5**: 29. **6**: 22. **7**: 4, 8, 65, 71. **9**: 5, 86. **10**: 19, 75.

CONTRIBUTORS

Anthony, Mrs. E. C. **8**: 66, 69. **9**: 19. **10**: 65, 84.
Atkinson, George F. **4**: 33.

Barclay, F. W. **6**: 25.
Bates, James A. 3-1. **4**: 2. **6**: 31. **8**: 19.
Beals, A. T. **4**: 1.
Bessey, Charles E. **7**: 14.
Beattie, R. Kent. **6**: 72.
Bidwell, Mary W. **8**: 61.
Birkenhead, J. **7**: 35.
Brandagee, T. S. **7**: 42.
Britton, Elizabeth G. **4**: 17, 62. **6**: 1. **7**: 34. **10**: 125.
Buchheister, J. C. **10**: 56.
Burnham, Stewart H. **4**: 62. **10**: 57.

Campbell, Mrs. Julia E. **5**: 62.
Carr, Mary E. 3-5. 10-7.
Clute, Willard N. 1-9. 2-6. 3-7. 4-5. 8-5. 10-1. 12-4. **4**: 8. **5**: 5, 45, 54, 60. **6**: 10, 28, 52, 75, 76. **7**: 61, 67, 91, 95, 97. **8**: 15, 37, 56, 64, 67, 73, 81, 85, 88, 89. **9**: 8, 11, 12, 16, 38, 43, 57, 64, 67, 85, 91. **10**: 5, 16, 26, 33, 47, 76, 77, 79, 82, 87, 89, 101, 122.

Crawford, Joseph. **8**: 17.
Curtiss, George F. 11-1.

Davenport, George E. **4**: 40. **5**: 24, 40. **7**: 97. **8**: 1, 70. **9**: 37, 77. **10**: 22, 59, 97, 126.
Dean, Mrs. A. D. 1-8. 8-1.
Dershimer, Mrs. T. D. 4-4.
Dodge, Raynal. **4**: 35. **6**: 31.
Druery, Charles T. **5**: 56. **6**: 26. **7**: 39, 99. **8**: 41, 42, 43, 87. **9**: 9. **10**: 51, 107.

Eaton, Alvah A. **4**: 60. **5**: 3, 11, 13, 25, 29, 43, 66. **6**: 5, 30, 45, 69. **7**: 7, 12, 33, 57, 85. **8**: 12, 19, 32, 60, 75. **9**: 3, 7, 33, 61, 81, 86, 91. **10**: 43, 54, 71, 78, 120.
Eggleston, Willard W. **7**: 4. **8**: 5.
Ferriss, James H. **7**: 98.
Fletcher, Dr. **5**: 57.
Flett, J. B. **7**: 9, 36. **8**: 40. **9**: 31. **10**: 24, 25.

Gilbert, Benj. D. **5**: 37. **6**: 4. **7**: 3, 10, 37, 41. **8**: 9, 62, 91. **9**: 6, 25, 53, 90, 92. **10**: 12, 74, 116.
Goetting, Mrs. A. E. **10**: 85.
Gorman, M. W. **5**: 9.
Graves, C. B. **8**: 18.
Graves, James A. 2-1. 4-1. **4**: 9. **7**: 39.
Green, H. A. **5**: 11. **6**: 27.
Grout, A. J. 5-9. 10-4. **6**: 24.

Haberer, Dr. J. V. **9**: 88.
Halsted, Byron D. **7**: 70.
Harper, Roland M. **7**: 65.
Hill, E. J. **8**: 31. **9**: 55. **10**: 82.
Hinsdale, George G. 1-6.
Hope, C. W. **7**: 46.
House, Homer D. **8**: 40. **9**: 84. **10**: 14.
Howe, Dr. M. A. **10**: 125.
Hulst, Rev. George D. **9**: 1.
Huntington, J. W. **7**: 12.
Hutchinson, H. D. 11-7.

Jenks, C. W. **8**: 91.

Kaufman, Pauline. **8**: 16.
Kellerman, Dr. W. A. **7**: 96.
Kent, E. C. **4**: 62.
Knowlton, F. L. **9**: 80.
Knowlton, Mrs. Stephen. **8**: 39.

Lemon, J. H. 2-3.

Maynard, Prof. C. J. **4**: 27.
Maxon, William R. **7**: 1, 15, 63, 90, 94. **8**: 8, 29, 58, 84. **9**: 19, 59. **10**: 42, 46.
McDonald, Frank E. **8**: 34.
McLouth, C. D. **4**: 3, 22. **5**: 7.
Meehan, Prof. Thomas. **8**: 25. **9**: 28.
Metcalf, Rest H. **10**: 59.
Miller, Mary F. **10**: 123.
Milligan, Mrs. J. M. **7**: 12.
Miyake, Kiichi. **7**: 59. **10**: 114.
Murrill, Prof. W. Alphonso. **5**: 1, 62.

Nelson, Elias. **7**: 29.
Noyes, Elmira E. 7-1.

Orr, Ellison. **10**: 56.
Osmun, A. Vincent. **10**: 58.

Palmer, T. Chalkley. **8**: 6.
Palmer, William. **7**: 70. **9**: 13, 18. **10**: 37.
Parish, S. B. **8**: 26. **9**: 40, 73.
Parsons, Frances Theodora. **6**: 74.
Pollard, Charles Louis. **7**: 71, 88.
Price, Sadie F. **4**: 57, 62. **6**: 30, 31. **8**: 86, 91.
Putnam, Bessie L. **7**: 15. **8**: 42.

Rich, Richard H. **4**: 63.
Robinson, Prof. B. L. **7**: 68.
Rous, F. Peyton. **4**: 64. **5**: 64.

Saunders, C. F. 10-6. 11-3. 12-1. **4**: 6, 20, 40, 64. **5**: 6, 26, 63, 67. **6**: 3, 21, 49. **7**: 31, 99. **8**: 14, 33, 52, 82. **9**: 5, 30. **10**: 41.
Setchell, Prof. William Albert. **8**: 49.

Shepard, C. Antoinette. **4**: 22.
Slosson, Margaret. **6**: 51. **7**: 5. **9**: 19, 29. **10**: 126.
Smith, George E. **10**: 111.
Smith, R. W. **8**: 66, 88.
Steele, W. C. **10**: 19.
Stevens, Mrs. M. L. 1-4.
Stewart, Guy L. **9**: 15.

Taylor, Mrs. Joseph D. **8**: 78.
Terry, Emily Hitchcock. **6**: 7. **8**: 36.
Thompson, Esther H. 11-5.

Underwood, Prof. L. M. 3-6. **5**: 14, 28, 53, 63. **7**: 95. **8**: 52, 59, 70. **9**: 49. **10**: 8, 27, 53, 85, 105.

Van Ingen, Gilbert. **9**: 7.

Waller, Elwyn. **7**: 15.
Walter, A. May. 1-5.
Waters, C. E. 1-3. 2-5. 3-3. 5-7. 6-1. 12-2. **4**: 4, 9, 38. **5**: 11, 21, 58. **6**: 24. **7**: 8, 92. **9**: 92. **10**: 1, 21, 50.
Watkins, W. G. **10**: 68.
Williams, Charles L. 1-8. 4-6. 8-2.
Williams, Newlin. **4**: 59.
Woodbury, E. D. **4**: 27.
Woolson, G. A. **7**: 13. **9**: 89.

Zirngiebel, Frances. **6**: 9.

LIST OF PUBLICATIONS NOTICED

ABBOTT'S In Nature's Realm, **9**: 46.
ADAMS' Nature Studies in Berkshire, **9**: 70.
ARTHUR'S Laboratory Exercises in Vegetable Physiology, **6**: 36.
ASA GRAY BULLETIN, The, **4**: 53. **6**: 34. **8**: 46. **9**: 45.
ATKINSON'S Elementary Botany, **7**: 18.
    First Studies in Plant Life, **9**: 94.
    Studies of American Fungi, **9**: 23.
    Transformation of Sporophyllary to Vegetative Organs, **5**: 36.
BAILEY'S Botanizing: A Guide to Field Collecting and Herbarium Work, **7**: 103.
    New England Wild Flowers and Their Seasons, **5**: 72.
BIRKENHEAD'S Ferns and Fern Culture, **6**: 59.
BISHOP'S Plants of Connecticut, **4**: 71.
BOTANICAL GAZETTE, **4**: 53, **5**: 19, 35, 51. **6**: 16. **8**: 46. **9**: 21.
BRITISH PTERIDOLOGICAL SOCIETY, Reports for 1894-7. **6**: 14.
BRITTON AND BROWN'S Illustrated Flora of the Northeastern States and Canada, **5**: 36, 51. **10**: 30.
BRITTON'S Manual of the Flora of the N. Eastern States and Canada, **10**: 30.
BROWN'S (KATE L.) The Plant Baby and Its Friends, **7**: 47.
BULLETIN OF THE TORREY BOTANICAL CLUB, **4**: 31. **5**: 19, 71. **7**: 17. **8**: 22, 23, 93. **10**: 45.
CAMPBELL'S Structure and Development of the Mosses and Ferns, **4**: 54.
CHRIST'S Die Farn Krauter der Erde, **5**: 35.
CLUTE'S A Fern Collector's Guide, **10**: 95.
    Our Ferns in Their Haunts, **9**: 70.
COOKE'S Fern Book for Everybody, 1-7. **4**: 31.
COULTER'S Plant Relations, **7**: 103.
    Plant Structure, **8**: 46.
DALLAS AND BURGIN'S Among the Mushrooms: A Guide for Beginners, **9**: 22.
DODGE'S Ferns and Fern Allies of New England, **5**: 20.
DRUERY'S Choice British Ferns, **5**: 49.
DUDLEY AND THURSTON'S Flora of the Lackawanna and Wyoming Valleys. **4**: 15.
EARLE'S Old Time Gardens, **10**: 61.

Eaton's Ferns of North America, 12-11.

Fernwort Papers. Printed for The Linnaean Fern Chapter, **9**: 29, 46.

Fitzpatrick's Ferns of Iowa and Their Allies, **6**: 35.

Flint's A Garden of Simples, **9**: 47.

Forester, The, **4**: 72.

Forest Leaves, **4**: 71.

Gibson's Blossom Hosts and Insect Guests, **10**: 95.

Gilbert's Working List of North American Pterydophytes, **9**: 95.

Goebel's Organography of Plants, **9**: 23.

Goldie, James, Diary of, **5**: 71.

Grout's Mosses With a Hand Lens, **9**: 22.

- Revision of the North American Isotheciaceae and Brachythecia, **6**: 15.

Heald's Laboratory Manual in Elementary Biology, **10**: 93.

Heller's Botanical Explorations in Southern Texas, **6**: 36.

- Catalog of the North American Plants North of Mexico, **6**: 36.
- Ferns and Flowering Plants of the Hawaiian Islands, **5**: 52.

Hervey's Observations on the Color of Flowers, **7**: 102.

Higginson's Procession of the Flowers, **5**: 52.

Howell's Flora of Northwest America, **9**: 48, 69.

Huntington's Studies of Trees in Winter, **10**: 62.

Indian Gardening, **9**: 45.

Iowa, Natural History Bulletin of the University of, Vol. 5, No. 2, **9**: 94.

Jenman's Ferns of the British West Indies and Guiana, **8**: 46, 70.

Journal of Botany, **6**: 83.

Journal of Mycology, **10**: 126.

Keeler's Our Native Trees and How to Know Them, **8**: 70.

Kentucky, Flora of Warren County, **4**: 32.

Knobel's Ferns and Evergreens of New England, 12-12.

Lloyd's The Geasters of North America, **10**: 95.

Lounsberry's A Guide to the Trees, **9**: 47.

- A Guide to the Wildflowers, **10**: 61.
- Southern Wildflowers and Trees, **10**: 29.

Lovejoy's Poetry of the Seasons, **7**: 47.

Marshall's The Mushroom Book, **9**: 47.

Matthews' The Field Book of American Wildflowers, **10**: 94.

Maxon's A List of the Ferns and Fern Allies of North America North of Mexico, **9**: 71.

McDougal's Elementary Plant Physiology, **10**: 94.

McMillan's Minnesota Plant Life, **8**: 24.

Meehan's Monthly, **4**: 32. **5**: 51. **9**: 44.
Millspaugh and Nuttall's Flora of West Virginia, **4**: 72.
Missouri Botanical Garden, Annual Report of, **4**: 72.
Moorehead's Prehistoric Implements, **8**: 95.
Mumford's Representative Forest Trees, **10**: 63.
National Science Journal, **5**: 36.
Nature Study, **9**: 44.
Nebraska, Flora of the Sandhills of: Dept. of Agriculture, **4**: 31.
Papers Presented at the Boston Meeting of the Linnaean Fern Chapter, **7**: 74.
Parsons' According to Season, **10**: 95.
  How to Know the Ferns, **7**: 74.
Peck's Mushrooms: Memoirs of N. Y. S. Museum, **9**: 69.
Plant World, The, **6**: 15, 35, 83.
Price's Fern Collector's Handbook and Herbarium, **5**: 51.
Proceedings of Canadian Institute for 1896, **5**: 35.
Public Ledger, Philadelphia, **5**: 71.
Rhodora, **8**; 93. **9**: 21, 44, 45.
Robinson's Ferns In Their Homes and Ours, 1-7.
Rusby and Jelliffe's Morphology and Histology of Plants, **8**: 23.
Sargent's Corn Plants: Their Uses and Ways of Life, **7**: 75.
Schneider's A Guide to the Study of Lichens, **6**: 84.
  A Text-Book of General Lichenology, **5**: 52.
Schwarz's Forest Trees and Forest Scenery, **10**: 62.
Step's Wayside and Woodland Blossoms, **4**: 54, 71.
Taylor's Student's Handbook of The Mushrooms of America, **5**: 72. **6**: 16, 35.
Torreya, **9**: 45.
Torrey's A World of Green Hills, **7**: 47.
Tricker's The Water Garden, **6**: 16.
Underwood's Moulds, Mildews and Mushrooms, **8**: 71.
  Our Native Ferns and Their Allies, 1-6. Sixth Edition, **8**: 94.
  Revision of the Genera of Ferns Proposed prior to 1832, **8**: 47.
University Forum, **5**: 19.
Urban's Symbolae Antillanae, **7**: 18.
Wait and Leonard's Among Flowers and Trees with the Poets, **10**: 29.
Waters' Analytical Key for the Ferns of the Northeastern States, Based on the Stipes, **10**: 93.
Williams' Next to the Ground, **10**: 126.
Wright's Flowers and Ferns in Their Haunts, **9**: 69.

LIST OF ILLUSTRATIONS

Adder's-tongue, variant. 7: 90.
Asplenium Bradleyi. 5: 22.
Asplenium Clutei. 8: 62.
Asplenium ebenoides. 5: 2. 10: 3.
Asplenium fontanum. 5: 46.
Asplenium montanum. 5: 27.
Beech fern. 4: 42.
Botrychium biternatum. 5: 30.
Botrychium ternatum oneidense. 9: 27.
Bryological Glossary. 7: 83, 110.
Camptosorus sibericus. 6: 75.
Catharinea angustata. 6: 64.
Cheilanthes amoena. 5: 44.
Christmas fern. 9: 11.
Clute, Willard Nelson. 10: 99.
Climbing fern, young. 9: 30.
Coiling frond, A. 4: 37.
Cystopteris fragilis. 6: 45.
Cystopteris fragilis, pinnae. 9: 64.
Cystopteris fragilis magnasora. 9: 65.
Davenport, George Edward. 9: 25.
Dicranum scoparium. 6: 87.
Dryopteris cristata x marginalis. 7: 6.
Dryopteris simulata. 4: 33.
Eaton, Alvah Augustus. 10: 33.
Eaton, Daniel Cady. 8: 49.
Equisetum arvense. 7: 31. 10: 49.
Funaria hygrometrica. 7: 54.
Gilbert, Benjamin Davis. 9: 49.
Goldie, John. 8: 73.
Hart's-tongue, The. 5: 55.
Hart's-tongue, young. 7: 2.
Heater for Glycerine Jelly Slides. 7: 22.
Horsetail stems. 5: 10.

Isoetes Echinospora Braunii. **9**: 57.
Lycopodium alopecuroides. **10**: 18.
Lycopodium lucidulum, bulblets of. **6**: 24.
Meehan, Thomas. **9**: 73.
Mnium sylvaticum. **7**: 79.
Nephrodium, Pinnae of. **10**: 80.
Oak fern. **4**: 43.
Onoclea sensibilis. **8**: 81.
Ophioglossum arenarium. **6**: 21.
Ophioglossum vulgatum. **4**: 61.
Osmunda cinnamomea, pinnae. **9**: 38.
Osmunda Claytoniana, pinnae. **9**: 39.
Parsons, Frances Theodora. **10**: 1.
Pellaea atropurpurea. **5**: 5.
Phycomitrium turbinatum. **7**: 54.
Pogonatum tenue. **6**: 40.
Polypodium vulgare. **6**: 29. **8**: 57.
Polytrichum commune. **6**: 19.
Pteris serrulata. **6**: 8.
Redfield, John Howard. **8**: 25.
Saunders, Charles Francis. **10**: 65.
Schizaea pusilla. **4**: 20.
Selaginella apus. **5**: 61.
Sori. **6**: 53.
Underwood, Lucien Marcus. **9**: 1.
Williamson, John. **8**: 1.

FERN BULLETIN PRICES

The first five volumes have long been out of print, and cannot be furnished at any price. Parts of volumes can occasionally be picked up by special arrangement with purchasers. Volumes VI to XII can still be had at 75c each (except Volume VI which costs $1.00 when ordered separately). When Volumes VI to XII are ordered at one time the price for the set is $4.50 postpaid. Prices will be advanced as numbers become scarce. At present we have but 18 sets of Volume VI. Subscriptions 75c a year. Address all orders to

WILLARD N. CLUTE & CO.
BINGHAMTON, N. Y.

The American Botanist

This publication stands in the same relation to flowering plants that THE FERN BULLETIN does to ferns, except that no technical articles are published. It deals with such subjects as flowers, fruits, seeds, pollination, nectar, odor and color, and pays special attention to plant adaptations, useful, poisonous, edible and medicinal plants. At present a colored plate is published in every other number. The magazine is a monthly of 20 to 24 pages and costs $1.00 a year. There are two volumes published in the year. A set of the seven volumes already published will be sent for $3.00. It is an absolute necessity to anyone interested in any phase of botany. Order before the early numbers go out of print. Address

WILLARD N. CLUTE & CO.
BINGHAMTON, N. Y.

An Index

To The

Fern Bulletin

Volumes Eleven to Twenty

(1903—1912)

Compiled by Fred S. Prince

Smithsonian Institution,
APR 15 1912
228144
National Museum

Joliet, Ill.
Willard N. Clute & Company
1912

An Index

To The

Fern Bulletin

Volumes Eleven to Twenty

(1903—1912)

Compiled by Fred S. Prince

Joliet, Ill.
Willard N. Clute & Company
1912

PREFACE

This Index to the last ten volumes of *The Fern Bulletin* is divided into three parts, viz:—A General Index, containing the titles of all articles closely cross referenced; a second part, Pteridographia, containing most of the short notes and unsigned articles; and an Index to Species containing the name of every fern, as it appears in the text, about which anything is said which might prove of value in its study.

Illustrated articles are marked with a star (*), articles containing descriptions of ferns are indicated by a dagger (†) and descriptions of new ferns are indicated by a double dagger (‡).

S. FRED PRINCE.

Champaign, Ill., December, 1912.

GENERAL INDEX

A

Adiantum capillus-veneris **12:** 110.
Adiantum capillus-veneris in Pennsylvania—Willard N. Clute. **12:** 121.
Adiantum pedatum. **12:** 110.
Adiantum tricholepis. **12:** 44.
Alabama, Asplenium Bradleyi in North.—Dr. E. L. Lee. **17:** 43.
Alabama, Station for Botrychium biternatum.—W. C. Dukes. **14:** 45.
American Fern Society, The. **13:** 95, 127. **14:** 31, 64, 96, 128. **15:** 31, 96. **16:** 32, 63, 96, 128. **17:** 32, 64, 96, 127. **18:** 28, 61, 96, 124.
*‡Aneimia, A New Type of—George E. Davenport. **13:** 18.
Annual Report **18:** 127.
Argument, Both Sides of the. **19:** 26.
Arizona, Ferns of Cochise Co.—James H. Ferriss. **17:** 1.
Arizona, Two New Polypodies from.—Willard N. Clute. **18:** 97.
Aspidium cristatum, Notes on. **15:** 79.
Aspidium simulatum. **17:** 18.
Aspidium spinulosum and its Varieties.—James A. Graves. **15:** 80.
Asplenium alternans, The Finding of.—James H. Ferriss. **19:** 36.
Asplenium alternans, The Identity of with Asplenium Ferrissii—W. A. Poyser. **19:** 33.
Asplenium alternans, The Finding of.—James H. Ferriss. **19:** 36.
*Asplenium Andrewsii—Willard N. Clute. **19:** 3.
Asplenium Bradleyi in North Alabama—Dr. E. L. Lee. **17:** 43.
Asplenium ebeneum Hortonae, Another Station for.—G. A. Woolson. **11:** 122.
Asplenium ebenoides—James M. Fetherolf. **12:** 26.
Asplenium ebenoides. **13:** 100.
Asplenium ebenoides in Chester Valley, Pa—T. Chalkley Palmer. **14:** 111.
Asplenium lanceum—Is it American.—A. A. Eaton. **12:** 79.
Asplenium Ferrissii, The Identity of with Asplenium alternans—W. A. Poyser. **19:** 33.
*Asplenium Glenniei—Willard N. Clute. **18:** 101.
Asplenium lanceum—Is it American.—A. A. Eaton. **12:** 79.
†Asplenium muticum.—B. D. Gilbert. **11:** 77.

Asplenium pinnatifidum in Connecticut. **15:** 15.
Asplenium platyneuron incisum. **17:** 21.
Asplenium pycnocarpum. **12:** 103.
Asplenium ruta-muraria on the Towers of Milan Cathedral—J. Schneck **12:** 119.
*Asplenium trichomanes x ruta-muraria.—Willard N. Clute. **16:** 46.
Athyrium filix-foemina v. pectinatum. **13:** 101.
Author Citation, The—Willard N. Clute. **14:** 46.
Azolla Caroliniana. **12:** 110. **13:** 120.

B

Babyhood of Ferns The—W. C. Dukes. **12:** 105.
Bad Lands, Ferns of the. **18:** 16.
Bloomington, Indiana, Ferns of—F. C. Greene. **16:** 68.
*†Blechnum spicant bipinnatum—Willard N. Clute. **19:** 72.
Blue Print Paper for Fern Mounts—James Shepard.—**17:** 54.
Book News. **11:** 30, 63, 94, 125. **12:** 29, 63, 94, 126. **13:** 32, 64, 94, 126, **14:** 30, 94, 127. **15:** 30, 62. **16:** 31, 94. **17:** 31, 63, 126. **18:** 23, 59, 93, 121. **19:** 25, 62, 95.
Books and Writers. **17:** 93.
Boston Fern, the, and its Sports—Willard N. Clute. **15:** 73.
Botanical Symposium—Third Annual Meeting. **14:** 91.
Botany, Teacher of, Wanted. **18:** 21.
Botrychia, The Distribution of—E. J. Winslow. **14:** 48.
Botrychium biternatum.—A. A. Eaton. **13:** 87.
Botrychium biternatum—L. H. McNeill. **14:** 74.
Botrychium biternatum, An Alabama Station for—W. C. Dukes. **14:** 45.
Botrychium, Fruiting of—Mrs. A. E. Scoullar. **16:** 84. **17:** 7.
Botrychiums in Sand. **15:** 82.
Botrychium lunaria. **16:** 117. **14:** *80.
Botrychium Lunaria Onondagense. **15:** 58.
Botrychium and Lycopodium, Raising prothallia of—Willard N. Clute. **12:** 83.
Botrychium lanceolatum in Northern Vermont.—E. J. Winslow. **17:** 105.
*†Botrychium matricariaefolium.—Geo. E. Davenport. **14:** 11.
Botrychium matricariaefolium tenebrosum. **17:** 19.
Botrychium ramosum, Variation in—Raynal Dodge. **18:** 33.
Botrychium ramosum, Further Notes on Variation in.—Raynal Dodge. **20:** 48.
*†Botrychium simplex—Willard N. Clute. **19:** 11.
Botrychium simplex fallax. **13:** 75.
Botrychium simplex, Southern Station for.—G. Ross Robertson. **15:** 17.
Botrychium simplex, The Forms of.—George E. Davenport. **14:** 84.

Botrychium ternatum f. Alabamense. **17:** 21.

Botrychium, The Resting of.—Bridget M. Rooney. **14:** 42.

Botrychiums, The Species Conception Among the Ternate.—Willard N. Clute. **11:** 115.

‡Botrychium, The Ternate, Two new Varieties of.—B. D. Gilbert. **11:** 88.

Boulder Fern, The.—Adella Prescott. **18:** 81.

*†Bracken, A Pedate—Willard N. Clute. **16:** 33.

*Bracken, The Philippine Pedate—Willard N. Clute. **18:** 43.

Brake, The Common, as Food. **15:** 41. **16:** 86.

Broad Wood Fern in Washington—A. S. Foster. **12:** 104.

C

California Fern Flora, Some Additions to.—S. B. Parish. **12:** 82.

California, Ferns of San Diego Co.—Laura F. Kimball. **19:** 42.

California, The Fern Flora of.—S. B. Parish. **12:** 1.

Catskills, Notes from the.—J. C. Buchheister. **11:** 15.

Cave Region of Stone County, Mo., Ferns of the—S. Fred Prince. **12:** 72.

Ceratopteris triangularis in Alaska.—L. M. Underwood. **12:** 58.

Change of Name, Vote on the. **13:** 95.

Check-list of the North American Fernworts—Willard N. Clute.
- Acrostichum. **14:** 56. **16:** 82.
- Adiantum. **14:** 57. **16:** 82.
- Aneimia. **13:** 120.
- Aspidium. **14:** 58. **16:** 82.
- Asplenium. **14:** 58, 86. **16:** 82. **17:** 21.
- Athyrium. **14:** 88.
- Azolla. **16:** 16.
- Blechnum. **14:** 89.
- Botrychium. **13:** 117. **17:** 21.
- Camptosrus. **14:** 89.
- Ceratopteris. **14:** 56.
- Cheilanthes. **14:** 89, 118.
- Cryptogramma. **14:** 119.
- Cystopteris. **14:** 119.
- Davallia. **14:** 120.
- Dicksonia. **14:** 120.
- Equisetum. **16:** 17.
- Gymnogramma. **14:** 121.
- Hypolepis. **15:** 19.
- Isoetes. **16:** 54.
- Lomaria. **15:** 19. **16:** 82.
- Lycopodium. **16:** 20. **17:** 20.

  Lygodium. **13:** 120.
  Marsilia. **16:** 16.
  Meniscium. **15:** 19.
  Nephrodium. **15:** 19.
  Nephrolepis. **15:** 45.
  Notholaena. **15:** 45.
  Ophioglossum. **13:** 118.
  Onoclea. **15:** 46.
  Osmunda. **13:** 119. **16:** 83.
  Pellaea. **15:** 46.
  Phegopteris. **15:** 48.
  Pilularia. **16:** 17.
  Polypodium. **15:** 120.
  Polystichum. **15:** 122. **16:** 83.
  Psilotum. **16:** 23.
  Pteris. **15:** 124.
  Salvinia. **16:** 16.
  Schizaea. **13:** 120. **16:** 83.
  Scolopendrium. **15:** 125.
  Selaginella. **16:** 51.
  Struthiopteris. **15:** 125. **16:** 83.
  Taenitis. **15:** 125.
  Trichomanes. **14:** 56.
  Vittaria. **15:** 126.
  Woodsia. **15:** 126.
  Woodwardia. **15:** 127.
Check-list, Additions to the. **16:** 82.
Check-list, More Additions to the.—Willard N. Clute. **17:** 20.
Check-list of North American Fernworts.—Willard N. Clute. Additions and Summary. **16:** 81.
Cheilanthes Moritziana. **12:** 44.
Cheilanthes Parishii, Rediscovery of.—C. F. Saunders and S. B. Parish. **16:** 35.
*Christmas Fern, A Bipinnatifid.—Willard N. Clute. **15:** 71.
*‡Christmas Fern. Another Form of.—Willard N. Clute. **20:** 24.
‡Christmas Fern, A New Form of the.—Willard N. Clute. **12:** 79.
*‡Christmas Fern, Still Another.—Willard N. Clute. **20:** 49.
*‡Cinnamon Fern, A Cut-leaved.—Willard N. Clute. **15:** 16.
*‡Cinnamon Fern, An Abnormal.—Willard N. Clute. **16:** 107.
Cinnamon Fern, Fall Fruiting of.—Willard N. Clute. **15:** 39.
‡Cinnamon Fern, The Forms of.—Willard N. Clute. **14:** 44.
Cliff-brakes, Rock Relations of the.—E. J. Hill. **20:** 1.
Cliff-brakes, Young—Willard N. Clute. **18:** 79.
Collecting in the Everglades.—Chas. T. Simpson. **17:** 38.

Complete Files, Owners of. **12:** 119.
Complete Sets. **18:** 21.
Complete Sets, Owners of. **20:** 89.
Concerning Forms and Hybrids.—Willard N. Clute. **12:** 85.
Concerning Nomenclature.—S. B. Parish. **15:** 38.
Connecticut, Asplenium pinnatifidum in. **15:** 38.
Connecticut, Equisetum scirpoides in.—A. Vincent Osmun. **11:** 44.
Connecticut, Equisetum variegatum in.—A. Vincent Osmun. **12:** 89.
Connecticut, The Fern-flora of.—Charles H. Bissell. **14:** 1.
†Connecticut Ferns, New Stations for Two Rare—Orra Parker Phelps. **12:** 118.
Contribution Toward a Fern Flora of Kentucky—Sadie F. Price. **12:** 65.
Correction, Isoetes Amesii.—A. A. Eaton. **12:** 89.
Correction, A. **18:** 15, 116.
Correction, A.—A. A. Eaton. **12:** 70.
*‡Crest Fern, A Cut-leaved.—Willard N. Clute. **16:** 12.
Crest-fern, Hardiness of Florida.—James H. Ferriss. **15:** 13.
Cultivating Our Ferns, On.—James H. Ferriss. **14:** 112.
Cultivation of Our Hardy Ferns.—Willard N. Clute. **11:** 18.
Current Literature Relating to European Ferns.—Aug. H. Hahne. **12:** 86, 119.
Current Literature Relating to Ferns, Index to—
    11: 31, 53, 91, 122. **12:** 27, 59, 89, 122. **13:** 26, 60, 90, 123. **14:** 26, 55, 90, 123. **15:** 26, 58, 90. **16:** 26, 58, 89, 122. **17:** 26, 58, 90, 120. **18:** 19, 56, 95, 117. **19:** 26, 56, 90, 124. **20:** 29, 61, 91.
Current Literature Relating to Foreign Ferns, Index to. **12:** 119.
*‡Cut-leaved Cinnamon Fern.—Willard N. Clute. **15:** 16.
*‡Cut-leaved Crest Fern.—Willard N. Clute. **16:** 12.
*Cystopteris, A. Precocious.—G. A. Woolson. **13:** 99.
*‡Cystopteris, A Slender Leaved.—Willard N. Clute. **16:** 75.

D

Dade Co., Florida, Preliminary List of Pteridophyta Collected in.—A. A. Eaton. **12:** 45.
*Death of Davenport, George Edward. **15:** 65.
    Eaton, Alvah A. **16:** 109.
    *Gilbert, Benjamin D. **15:** 65.
    *Graves, James Ansel. **18:** 1.
    Hart, J. H. **19:** 54.
    Horton, Mrs. **16:** 57.
    Lemmon, J. S. **17:** 21.
    Peters, Thomas Minot. **17:** 111.
    *Price, Sadie F. **11:** 85. **12:** 25.

Saunders, Mrs. Elizabeth H. **18:** 128.
*Scott, Robert Robinson. **11:** 50.
*Underwood, Lucien Marcus. **15:** 65.
Deciduous British Ferns. **15:** 75.
Destroying the Ferns. **12:** 55.
*†Dicksonia, Another form of.—Willard N. Clute. **19:** 7.
Dicksonia pilosiuscula f. nana. **13:** 101.
Dimorphic Ferns, The Relation between the Fertile and Sterile Leaves of. —George F. Atkinson. **19:** 81.
Dimorphic Fronds, On Changes of Function in.—Willard N. Clute. **16:** 65
Distribution of Asplenium alternans, The.—Willard N. Clute. **19:** 38.
Distribution of The Botrychia.—E. J. Winslow. **14:** 48.
Distribution of Certain Plants in Western Pennsylvania.—Notes on the. —Otto E. Jennings. **18:** 99.
*Dodge, Raynal.—Willard N. Clute. **12:** 51.
Dodge's Fern.—A. A. Eaton. **12:** 57.
Dorset, More About the Ferns of.—Mrs. E. H. Terry. **13:** 84.
*†Drymoglossum carnosum.—Willard N. Clute. **19:** 65.
Dryopteris Filix-mas in Vermont.—Tracy E. Hazen. **14:** 25.
*†Dwarf Spleenwort, The.—Willard N. Clute. **17:** 48.

E

Eaton, Alvah A., Death of. **16:** 109.
*‡Ebony Fern, A Forked.—Willard N. Clute. **17:** 88.
*‡Ebony Spleenwort, Forms of. **19:** 115.
Ecology of Some Tropical Ferns, The.—E. B. Copeland. **15:** 102.
Editorial. **11:** 28, 60, 92, 123. **12:** 28, 60, 92, 124 **13:** 28, 61, 92, 124. **14:** 28, 60, 92, 124. **15:** 28, 60, 92, 128. **16:** 28, 60, 92, 124. **17:** 28, 60, 92, 122. **18:** 22, 58, 88, 118. **19:** 22, 58, 92, 126. **20:** 30, 62, 92.
‡Equisetum, A New Species of.—Willard N. Clute. **12:** 20.
Equisetum hyemale.—C. E. Waters. **15:** 82.
Equisetum hyemale, Notes on.—Chas. C. Plitt. **16:** 113.
‡Equisetum in North America, The Genus.—A. A. Eaton. **11:** 7, 40, 73, 108. **12:** 23, 39.
Equisetum, The Measurements of Variation in.—Willard N. Clute. **12:** 15
Equisetum robustum.—R. S. Cocks. **11:** 16.
Equisetum scirpoides in Illinois.—E. J. Hill. **13:** 21.
Equisetum scirpoides in Connecticut.—A. Vincent Osmun. **11:** 44.
Equisetum variegatum Alaskanum, A Correction.—A. A. Eaton. **12:** 70.
Equisetum variegatum in Connecticut.—A. Vincent Osmun. **12:** 89.
Equisetum variegatum Jesupi, A Correction.—A. A. Eaton. **12:** 70.
European Ferns, Current Literature Relating to.—Aug. H. Hahne. **12:** 86.

Everglades, Collecting in.—Chas. T. Simpson. **17:** 38.
Evergreen Ferns. C. E. Waters. **19:** 118.
Evergreens, Cash for.—Willard N. Clute. **15:** 77.

F

Fairy Rings of Lycopodium sabinaefolium in Maine.—Alvin H. Trundy. **15:** 70.
Fall Fruiting of Cinnamon Fern.—Willard N. Clute. **15:** 39.
Fall Fruiting of Osmunda.—W. C. Dukes. **12:** 103. **16:** 121.
Families of Fern-like Plants. **17:** 50.
Families of Fern-like Plants.—C. E. Bessey. **16:** 70.
*†Fern, A Problematical.—Willard N. Clute. **20:** 43.
Fern Bulletin, Additional Sets of. **13:** 26.
Fern Bulletin, Another Complete Set. **17:** 115.
Fern Bulletin, Complete Sets. **13:** 87. **18:** 21.
Fern Bulletin, Complete Set Changes Hands. **18:** 54.
Fern Bulletin, More Complete Sets. **15:** 87.
Fern Bulletin, Owners of Complete Files. **15:** 63. **12:** 119.
*†Fern, But Half a.—Willard N. Clute. **16:** 5.
Fern Chapter.—Linnaean. **11:** 32, 96. **12:** 30, 64, 96, 127. **13:** 32, 64.
Fern Chapter Notes. **12:** 96.
*‡Fern, Christmas, Another Form of.—Willard N. Clute. **20:** 24.
Fern Culture.—William Scott. **14:** 50.
Fern Flora of California, Some Additions to.—S. B. Parish. **12:** 82.
Fern Flora of California, The.—S. B. Parish. **12:** 1.
Fern Flora of Connecticut, The.—Charles H. Bissell. **14:** 1.
Fern Flora of Florida.—A. H. Curtiss. **12:** 33.
Fern Flora of Georgia, The.—Roland M. Harper. **13:** 1.
Fern Flora of Illinois. **20:** 33, 73.
*Fern Flora of Indiana, The.—F. C. Greene. **19:** 102. **20:** 81.
Fern Flora of Indiana, Additions to.—E. J. Hill. **20:** 25.
Fern Flora of Iowa, The.—T. J. and M. F. L. Fitzpatrick. **11:** 65.
Fern Flora of Kentucky, Contributions Toward a.—Sadie F. Price. **12:** 65
Fern Flora of Louisiana, The.—Willard N. Clute and R. S. Cocks. **11:** 1
Fern Flora of Maine, The.—Dana W. Fellows. **14:** 97.
Fern Flora of Michigan, The.—C. H. Dodge. **20:** 6.
Fern Flora of Montana, The—T. J. Fitzpatrick. **12:** 97.
Fern Flora of New York, The.—B. D. Gilbert. **11:** 97.
Fern Flora of Ohio.—Lewis S. Hopkins. **15:** 1.
Fern Flora of Ontario, The.—A. B. Klugh. **14:** 65.
Fern Flora of Pennsylvania.—W. A. Poyser. **17:** 65.
Fern Fora of Texas, The.—Julian Reverchon. **11:** 33.
Fern Flora of Vermont, The.—W. W. Eggleston. **13:** 33.

Fern Flora of Washington, The.—J. B. Flett. **11:** 79.
Fernery, My Indoor.—C. E. Waters. **11:** 16.
Fern-like Plants Families of.—Dr. C. E. Bessey. **16:** 70.
Fern Mounts, Blue Print Paper for.—James Shepard. **17:** 54.
Fern Names, Pronunciation of.—Adella Prescott. **17:** 86.
Fern New to the United States, A.—Willard N. Clute. **18:** 104.
Fern Notes.—E. J. Hill. **18:** 65.
Fern Seed.—Sir Ray Lankester. **19:** 74.
Fern Society, The American. **13:** 95, 127. **14:** 31, 64, 96, 128. **15:** 31, 96. **16:** 32, 63, 96, 128. **17:** 32, 64, 96, 127. **18:** 28, 61, 96, 123.
Fern Students, The Fifth Meeting of. **13:** 128.
Fern Students, Fourth Meeting of. **12:** 84.
Fern Students, Sixth Meeting of. **17:** 64.
Fern Students, The Third Meeting of. **12:** 31.
Fern Study, Fifteen Years of.—Willard N. Clute. **15:** 97.
Fern Varieties.—Chas. T. Druery. **12:** 52.
Fern Varieties, The Naming of. **18:** 49.
Ferns, American, Notes on.—William R. Maxon. **11:** 38. **12:** 101.
Ferns, Apospory in. **18:** 84.
Ferns, British, Deciduous. **15:** 75.
Ferns, Destroying the. **12:** 55.
Ferns Evergreen.—C. E. Waters. **19:** 118.
Ferns for Winter. **17:** 121.
Ferns in Bottles. **11:** 120. **20:** 74.
Ferns, Juvenile.—Adella Prescott. **18:** 45.
Ferns, New Forms of.—Chas. T. Druery. **11:** 48, 118.
‡Ferns, New or Rare from the Southwest.—Willard N Clute. **12:** 43.
Ferns, Notes on Indiana.—F. C. Greene. **17:** 12.
Ferns, Notes on Various.—S Fred Prince. **20:** 52.
Ferns, Notes on Some Hybrid.—Margaret Slosson. **16:** 97.
Ferns of Ann Arbor, Michigan.—Stewart H. Burnham. **12:** 50.
Ferns of Bloomington, Indiana.—F. C. Greene. **16:** 68.
Ferns of the Cave Region of Stone County, Mo.—S. Fred Prince. **12:** 72.
Ferns of Cochise County, Arizona.—Jas. H. Ferriss. **17:** 1.
Ferns, Additional Dorset. **15:** 49.
Ferns of Dorset, More About the.—Mrs. E. H. Terry. **13:** 84.
Ferns of the Florida East Coast, Notes on the.—Mrs. E. C. Anthony. **11:** 21.
Ferns of Northwestern Missouri.—F. C. Greene. **19:** 14.
Ferns of San Diego County, California.—Laura F. Kimball. **19:** 42.
Ferns of the Upper Susquehanna Valley.—George F. Cleveland. **16:** 101.
Ferns of Washington, Notes on the.—T. J. Fitzpatrick. **12:** 108.
Ferns, On Cultivating Our.—James H. Ferriss. **14:** 112.

*‡Ferns, Rare Forms of. **15:** 16, 43, 71, 101. **16:** 12, 46, 75, 107. **17:** 9, 45, 88, 99.
Ferns, Species and Varieties Among the.—Willard N. Clute. **13:** 65.
Fern's Struggle for Existence in the Tropics.—Willard N. Clute. **15:** 34.
Ferns, Travelling.—Willard N. Clute. **17:** 55.
Ferns, Walking.—Adella Prescott. **19:** 48.
Fernwort, A Weedy. **12:** 58.
Ferns, Tree.—W. R. Maxon. **20:** 84.
*Fern Study, Fifteen Years of.—Willard N. Clute. **15:** 97.
Fernwort Notes.—Willard N. Clute. **11:** 12, 46. 71, 105.
Fernworts, Check-list of the North American.—Willard N. Clute. For list of Genera see Check-list of the North American Fernworts.
Fernworts, Check-list of the North American, Additions and Summary. Willard N. Clute. **16:** 81.
Fernworts, Check-list of the North American, More Additions to.—Willard N. Clute. **17:** 20.
Fernworts Collected in Jamaica, List of.—Willard N. Clute. **11:** 54.
*‡Fernworts, Rare Forms of. **18:** 10, 47, 79, 106. **19:** 11, 50, 72, 115. **20:** 24, 49, 74.
Fernworts, Some Mexican.—B. D. Gilbert. **13:** 79.
Fernworts of Western New York, Remarks on Some.—Dr. E. J. Hill. **12:** 18.
Fertile and Sterile Fronds, Relation Between in Dimorphic Ferns.—Geo. F. Atkinson. **19:** 81.
Fertilization in Ferns.—Sir Ray Lankester. **19:** 86.
Fifth Meeting of Fern Students, The. **13:** 128.
Files, Owners of Complete. **12:** 119.
*Filmy Fern, The Round-leaved.—Willard N. Clute. **15:** 14.
Flora of Louisiana, Additional Literature Relating to.—Mary A Day. **12:** 54.
Florida Crest-fern, Hardiness of.—James H. Ferriss. **15**: 13.
Florida, Collecting in the Everglades of.—Chas. T. Simpson. **17:** 38.
Florida East Coast, Notes on the Ferns of the.—Mrs. E. C. Anthony. **11:** 21.
Florida Fern, New Station for a Rare.—Willard N. Clute. **16:** 38.
Florida, Fern Flora of.—A. H. Curtiss. **12:** 33.
Florida, Preliminary List of Pteridophyta Collected in Dade Co.—A. A. Eaton. **12:** 45.
Florida Ferns, Where they Grow.—Henry H. Negley. **14:** 107.
Foreign Ferns, Current Literature Relating to. **12:** 119.
*‡Forked Ebony Fern, a.—Willard N. Clute. **17:** 88.
Forking Ferns.—Aug. H. Hahne. **12:** 114.
Forms and Hybrids, Concerning.—Willard N. Clute. **12:** 85.
Forms of Botrychium simplex, The.—George E. Davenport. **14:** 84.

‡Forms of The Cinnamon Fern.—Willard N. Clute. **14:** 44.
*‡Forms of Ebony Spleenwort. **19: 115.**
*†Forms of Marginal Shield Fern. **19:** 50.
*‡Four Aberrant Osmundas.—Willard N. Clute. **17:** 9.
Fourth Meeting of Fern Students. **12:** 84.
Fragrant Shield Fern.—James A. Bates. **19:** 80.
Fronds of Lygodium, The.—Willard N. Clute. **18:** 7.
Fruiting of Botrychium.—Mrs. A. E. Scoullar. **17:** 7. **16:** 84.
Fruiting of Cinnamon Fern, Fall.—Willard N. Clute. **15:** 39.
Fruiting of Osmunda, Fall.—W. C. Dukes. **12:** 103. **16:** 121.

G

Georgia, The Fern Flora of.—Roland M. Harper. **13:** 1
Georgia Ferns, Mrs. Taylor's.—B. D. Gilbert. **13:** 108.
Georgia, How and Where Ferns Grow in Southwest.—Mrs. A. P. Taylor. **13:** 53.
Gold Fern, The California.—A. A. Eaton. **12:** 77.
Grape Ferns.—Adella Prescott. **17:** 100.
*Grass-like Polypodium, The.—Willard N. Clute. **16:** 99.
*Graves, James Ansel.—Willard N. Clute. **18:** 1.

H

Habitat of Two Ferns, Variations in the.—J. B. Flett. **11:** 17.
Habitat, The Effect of upon Ophioglossum.—Willard N. Clute. **19:** 71.
Hardiness of Florida Crest-fern.—James H. Ferriss. **15:** 13.
Hardy Ferns, The Cultivation of Our.—Willard N. Clute. **11:** 18.
Hart's-tongue in Tennessee, The.—E. W. Graves. **19:** 70.
Hart's-tongue in Tennessee, The.—Dr. E. L. Lee. **14:** 82.
*†Hemigramma latifolia.—Willard N. Clute. **19:** 46.
*†Hemionitis, The Arrow-leaved.—Willard N. Clute. **18:** 76.
Humus Collectors and Myrmecophilous Ferns. **17:** 107.
Hybrid Ferns, Notes on Some.—Margaret Slosson. **16:** 97.
*Hymenophyllum denticulatum in Central China.—Otto E. Jennings. **17:** 106.

I

Illinois, Equisetum scirpoides in.—E. J. Hill. **13:** 21.
Illinois, Fern Flora of. **20:** 33, 73.
Illinois Ferns near Lake Michigan.—Mary Lee Van Hook. **13:** 23.
Index to Current Literature relating to Ferns. **11:** 31, 53, 91, 122. **12:** 27, 59, 89, 122. **13:** 26, 60, 91, 123.
Index to Current Literature relating to Foreign Ferns. **12:** 119.
Index to Recent Literature. **14:** 26, 55, 90, 123. **15:** 26, 58, 90. **16:** 26, 58, 89, 122. **17:** 26, 58, 90, 120. **18:** 19, 56, 95, 117. **19:** 20, 56, 90, 124. **20:** 29, 61, 91.

Indiana, Additions to the Fern Flora of.—E. J. Hill. **20:** 25.
*Indiana, The Fern Flora of.—F. C. Greene. **19:** 102.
Indiana Ferns, Notes on.—F. C. Greene. **17:** 12.
*In Memorium. **15:** 65.
Iowa, The Fern-flora of.—T. J. and M. F. L. Fitzpatrick. **11:** 65.
Isoetes Amesii; a Correction.—A. A. Eaton. **12:** 89.
‡Isoetes echinospora Flettii. **13:** 51.
‡Isoetes echinospora maritima. **13:** 52.
‡Isoetes Engelmanni fontana. **13:** 52.
‡Isoetes, Notes on.—A. A. Eaton. **13:** 51.
‡Isoetes Piperi. **13:** 51.
Isoetes saccharata in the Delaware River.—W. A. Poyser. **15:** 18.
Isoetes, What Constitutes a species in the Genus.—Willard N. Clute. **13:** 41.

J

Jamaica, List of Fernworts Collected in.—Willard N. Clute. **11:** 54.
Juvenile Ferns.—Adella Prescott. **18:** 45.

K

Kentucky, Contribution Toward a Fern Flora of.—Sadie F. Price. **12:** 65

L

Lady Fern, The.—Adella Prescott. **18:** 12.
Lady Ferns, Green and Red Stiped.—William Palmer. **14:** 78.
Linnaean Fern Chapter. **11:** 32, 96. **12:** 30, 64, 96, 127. **13:** 32, 64.
Literature Relating to Ferns, Index to Current. **11:** 31, 53, 91, 122. **12:** 27, 59, 89, 122. **13:** 26, 60, 90, 123.
Literature Relating to European Ferns, Current. **12:** 86.
Literature Relating to Foreign Ferns, Current. **12:** 119.
Literature, Index to Recent. **14:** 26, 55, 90, 123. **15:** 26, 58, 90. **16:** 26, 58, 89, 122. **17:** 26, 58, 90, 120. **18:** 19, 56, 95, 116. **19:** 20, 56, 90, 124. **20:** 29, 61, 91.
Lomaria spicant bipinatum in America.—Chas. T. Druery. **14:** 91.
*Lomaria spicant, Variable Sporelings of.—Amedee Hans. **15:** 33.
Lonchitis, A Hunt for.—Willard N. Clute. **18:** 111.
Louisiana, Additional Literature Relating to Flora of.—Mary A. Day. **12:** 54.
Louisiana, The Fern-flora of.—Willard N. Clute and R. S. Cocks. **11:** 1.
Louisiana, Notes From.—R. S. Cocks. **12:** 110.
*†Lycopodium, An Aberrant.—Willard N. Clute. **18:** 10.
*†Lycopodium adpressum f. polyclavatum from South Carolina.—W. C. Coker. **17:** 83.

‡Lycopodium alopecuroides adpressum polyclavatum. **17:** 45.
Lycopodium, A New, From New Hampshire.—Sidney F. Blake. **18:** 9.
Lycopodium, Botrychium and, Raising Prothallia of. **12:** 83.
Lycopodium lucidulum porophilum in Ohio.—Almon N. Rood. **16:** 105.
Lycopodium porophylum in the Dells of the Wisconsin.—E. J. Hill. **19:** 1.
Lycopodium sabinaefolium, Fairy Rings of, in Maine.—Alvin H. Trundy. **15:** 70.
Lycopodium Selago-lucidulum, Observations on.—J. B. Flett. **13:** 48.
Lygodium, The Fronds of.—Willard N. Clute. **18:** 7.

M

Maine, The Fern-flora of.—Dana W. Fellows. **14:** 97.
*Male Fern, The.—Willard N. Clute. **19:** 97.
*†Marginal Shield Fern, Forms of.—Willard N. Clute. **19:** 50.
*Maxon, William Ralph.—B. D. Gilbert. **11:** 121.
Mexican Fernworts, Some.—B. D. Gilbert. **13:** 79.
Michigan, Fern Flora of.—C. K. Dodge. **20:** 6.
Michigan Ferns of Ann Arbor.—Stewart H. Burnham. **12:** 50.
Miscellaneous Notes. **11:** 52.
Missouri, Ferns of the Cave Region of Stone County.—S. Fred Prince. **12:** 72.
Missouri, Ferns of Northwestern.—F. C. Greene. **19:** 14.
Montana, Fern Flora of.—T. J. Fitzpatrick. **12:** 97.
*Moonwort, The.—Willard N. Clute. **14:** 80.
Mountain Spleenwort in Northwestern Ohio.—E. W. Vickers. **17:** 97.
Nebraska, Ophioglossum vulgatum in.—James M. Bates. **20:** 67.

N

Nephrodium Boottii or Nephrodium spinulosum x cristatum. **13:** 86.
*†Nephrodium deltoideum.—Willard N. Clute. **20:** 20.
Nephrodium Hybrids, Notes on.—E. J. Winslow. **17:** 33.
*†Nephrodium patens and Nephrodium molle.—Willard N. Clute. **16:** 49.
Nephrodium Pittsfordensis.—G. A. Woolson. **12:** 106.
Nephrodium simulatum, Observations on.—J. C. Buchheister. **16:** 104.
Nephrolepis, Raising from Spores.—A. A. Eaton. **11:** 47.
*†New Fern from the United States, A.—Willard N. Clute. **16:** 1.
‡New Form of Christmas Fern, A—Willard N. Clute. **12:** 79.
New Forms of Ferns.—Chas. T. Druery. **11:** 48, 118.
New Hampshire, A New Lycopodium from.—Sidney F. Blake. **18:** 9.
New Jersey, Asplenium ebeneum in. **18:** 116.
†New Species of Equisetum, A.—Willard N. Clute. **12:** 20.

*‡New Type of Aneimia.—George E. Davenport. **13:** 18.
New York, Asplenium ebenoides in.—Stewart H. Burnham. **16:** 111.
New York Fern, The.—Adella Prescott. **17:** 42.
New York, Fern-flora of.—B. D. Gilbert. **11:** 97.
New York, Remarks on Some Fernworts of Western.—Dr. E. J. Hill. **12:** 18.
New York, Some Rare Ferns of Central.—H. D. House. **12:** 80.
‡New or Rare Ferns from the Southwest.—Willard N. Clute. **12:** 43.
New Station for a Rare Florida Fern.—Willard N. Clute. **16:** 38.
†New Stations for two Rare Connecticut Ferns.—Mrs Orra Parker Phelps. **12:** 118.
New Zealand Ferns, On Some.—Willard N. Clute. **16:** 42.
Nomenclature, A Question of.—A. A. Eaton. **16:** 77.
Nomenclature, Concerning.—S. B. Parish. **15:** 38.
North American Fernworts, A Check-list of.—Willard N. Clute. **13:** 109. **14:** 56, 86, 118. **15:** 19, 45, 120. **16:** 16, 51.
North American Fernworts, A Check-list of, Additions and Summary. Willard N. Clute. **16:** 81.
North American Fernworts, More Additions to the Check-list of the. —Willard N. Clute. **17:** 20.
‡North American Pteridophytes, Observations on.—B. D. Gilbert. **13:** 74, 100.
Notes. **11:** 27, 93. **12:** 63, 90. **13:** 32, 88, 121. **14:** 63.
Notes from the Catskills.—J. C. Buchheister. **11:** 15.
‡Notes on American Ferns.—Wm. R. Maxon. **11:** 38. **12:** 101. **19:** 67.
Notes on Aspidium cristatum.—C. E. Waters. **15:** 79.
Notes on Equisetum hyemale.—Chas. C. Plitt. **16:** 113.
Notes on Indiana Ferns.—F. C. Greene. **17:** 12.
‡Notes on Isoetes.—A. A. Eaton. **13:** 51.
Notes on the Distribution of Certain Plants in Western Pennsylvania.—Otto E. Jennings. **18:** 99.
Notes on the Ferns of the Florida East Coast.—Mrs. E. C. Anthony. **11:** 21.
Notes on the Ferns of Washington.—T. J. Fitzpatrick. **12:** 108.
Notes on Nephrodium Hybrids.—E. J. Winslow. **17:** 33.
Notes on Some Hybrid Ferns.—Margaret Slosson. **16:** 97.

O

Oak and Beech Ferns, The—Adella Prescott. **19:** 9.
Ohio, Fern Flora of.—Lewis S. Hopkins. **15:** 1.
Ohio, Lycopodium lucidulum porophilum in.—Almon N. Rood. **16:** 105.
*Oleandra, The Genus.—Willard N. Clute. **14:** 106.
*‡Onoclea sensibilis f. obtusilobata and Allied Forms.—Willard N. Clute. **18:** 106.

Ontario, The Fern-flora of.—A. B. Klugh. **14:** 65.

Ontario, Ophioglossum vulgare in.—F. J. Morris. **17:** 102.

Ophioglossum Californicum in Central California.—S. B. Parish. **13:** 49.

Ophioglossum, The Effect of Habitat upon.—Willard N. Clute. **19:** 71.

Ophioglossum vulgatum in Nebraska.—James M. Bates. **20:** 67.

Ophioglossum vulgatum in Ontario.—F. J. A. Morris. **17:** 102.

Osmunda, Fall Fruiting of.—W. C. Dukes. **12:** 103.

Osmunda cinnamomea, f. angusta.—D. Lewis Dutton. **17:** 89.

Osmunda cinnamomea f. incisa. **13:** 103.

*‡Osmundas, Four Aberrant.—Willard N. Clute. **17:** 9.

Osmundas, The.—Adella Prescott. **20:** 21.

‡Ostrich Fern, A New Variety of.—William A. Terry. **16:** 3.

Ostrich Fern, var. pubescens.—A. A. Eaton. **16:** 47.

Owners of Complete Files. **12:** 119.

Owners of Complete Sets. **20:** 89.

P

*†Pedate Bracken, A.—Willard N. Clute. **16:** 33.

Pellaea aspera. **12:** 43.

Pellaea ornithopus.—A. A. Eaton. **12:** 113.

Pennsylvania, Adiantum capillus-veneris in.—Willard N. Clute. **12:** 121.

Pennsylvania, Asplenium ebenoides in Chester Valley, Pa.—T. Chalkley Palmer. **14:** 111.

Pennsylvania, Fern Flora of.—W. A. Poyser. **17:** 65.

Pennsylvania, Notes on the Distribution of Certain Plants in Western. —Otto E. Jennings. **18:** 99.

Peters, Thomas Minot, Death of. **17:** 111.

*Philippine Pedate Bracken.—Willard N. Clute. **18:** 43.

Pilosiuscula, Meaning of.—C. E. Waters. **18:** 128.

Pinnatifid Spleenwort in Northern Ohio, The.—Ernest W. Vickers. **18:** 4.

*‡Polypodies, Two new from Arizona.—Willard N. Clute. **18:** 97.

*†Polypodium or Xiphiopteris.—Willard N. Clute. **20:** 65.

Polypodium falcatum, The Status of. **12:** 101.

*†Polypodium piloselloides.—Willard N. Clute. **14:** 59.

*†Polypodium, Some Variations in.—Willard N. Clute. **18:** 47.

*†Polypodium, The Grass-like.—Willard N. Clute. **16:** 99.

‡Polypodium vulgare var. Alato-multifidum.—B. D. Gilbert. **14:** 105.

‡Polypodium vulgare and its Varieties in America.—B. D. Gilbert. **14:** 33.

Polypodium vulgare auritum.—H. W. Jewell. **16:** 85.

Polystichum acrostichoides and Some Insects that Infest it.—Augusta Schenck Kalbfleisch. **12:** 48.

Polystichum acrostichoides x angulare.—Amedee Hans. **16:** 14.

†Polystichum acrostichoides incisum Interpreted.—E. J. Winslow. **15:** 101.
Polystichum acrostichoides recurvatum. **14:** 41.
Polystichum acrostichoides recurvatum.—Amadee Hans. **16:** 15.
*‡Polystichum acrostichoides multifida. **17:** 99.
*Price, Sarah Frances, Death of. **11:** 85. **12:** 25.
Priority and Fern Names.—Willard N. Clute. **20:** 68.
Pronunciation of Fern Names.—Adella Prescott. **17:** 86.
Prothallia of Botrychium and Lycopodium, Raising.—Willard N. Clute. **12:** 83.
Pteridographia. **15:** 24, 49, 82. **16:** 24, 86, 117. **17:** 22, 112, **18:** 13, 51, 83, 115. **19:** 15, 53, 84, 119. **20:** 26, 56, 74.
Pteridophyta Collected in Dade County, Florida.—A. A. Eaton. **12:** 45.
Pteridophyta of Southern New Brunswick, Notes on the.—A. B. Klugh. **19:** 4.
‡Pteridophytes, Observations on North American.—B. D. Gilbert. **13:** 74, 100.
*Pteris aquilina pseudocaudata, an aberrant.—Willard N. Clute. **15:** 43.

R

Raising Nephrolepis from Spores.—A. A. Eaton. **11:** 47.
Raising Prothallia of Botrychium and Lycopodium.—Willard N. Clute. **12:** 83.
Rare Connecticut Ferns, New Stations for Two.—Mrs. Orra Parker Phelps. **12:** 118.
Rare Ferns of Central New York, Some.—H. D. House. **12:** 80.
*‡Rare Forms of Ferns. **14:** 115. **15:** 16, 43, 71, 101. **16:** 12, 46, 75, 107. **17:** 9, 45, 88, 99.
*‡Rare Forms of Fernworts. **18:** 10, 47, 79, 99, 106. **19:** 11, 50, 72, 115. **20:** 24, 51, 74.
Recently Discovered Species and Forms.—Willard N. Clute. **11:** 24.
Rediscovery of Cheilanthes Parishii.—C. F. Saunders and S. B. Parish. **16:** 35.
Report, The Annual. **18:** 127.
Resting of Botrychium.—Bridget M. Rooney. **14:** 42.
Reversions and their Fluctuations.—G. E. Davenport. **13:** 106.
Rock Relations of the Cliff-brakes.—E. J. Hill. **20:** 1.
*†Round-leaved Filmy Fern, The.—Willard N. Clute. **15:** 14.
*†Round-leaved Maidenhair.—Willard N. Clute. **13:** 49.
*‡Royal Fern, A round-leaved.—Willard N. Clute. **14:** 115.
*†Running Fern, A.—Willard N. Clute. **17:** 16.

S

Saunders, Death of Mrs. **18:** 128.

Schizaea pusilla, How I Found.—Mrs. E. G. Britton. **19:** 77.
Schizaea pusilla in Cape Breton.—Geo. E. Nichols. **13:** 97.
Schizaea pusilla at Home.—C. F. Saunders. **20:** 54.
Scolopendrium Lindeni, Hook, Can be Separated from S. vulgare, Sm.?—H. Christ. **11:** 86.
Scolopendrium from Canada.—Homer D. House. **11:** 107.
Scholopendrium vulgare.—C. F. Saunders. **17:** 57.
*Scolopendrium vulgare in Ontario.—A. B. Klugh. **13:** 104.
*Scott, Robert Robinson.—Willard N. Clute. **11:** 50.
Scouring Rush Along the Mississippi, The. **13:** 85.
Selaginella Caribensis. **13:** 74.
Selaginella Douglasii, A New Station for.—Walter Albion Squires. **14:** 116.
Shelter Island Ferns. **17:** 114.
*†Shield Fern, A Walking.—Willard N. Clute. **13:** 78.
*†Shield Fern, Forms of Marginal. **19:** 50.
Shield Fern Fragrant.—James A. Bates. **19:** 80.
Singular View, A.—L. M. Underwood. **11:** 90.
*‡Slender Leaved Cystopteris, A.—Willard N. Clute. **16:** 75.
*Solar Prints of Plants.—James Shepard. **16:** 39.
*South Carolina, Lycopodium adpressum f. polyclavatum from.—W. C. Coker. **17:** 83.
Southern New Brunswick, Notes on the Pteridophytes of.—A. B. Klugh. **19:** 4.
‡Southwest, New or Rare Ferns from the.—Willard N. Clute. **12:** 43.
Species and Forms Recently Discovered.—Willard N. Clute. **11:** 24.
Species and Varieties Among the Ferns.—Willard N. Clute. **13:** 65.
Species Conception Among the Ternate Botrychiums.—Willard N. Clute. **11:** 115.
*‡Spleenwort, Ebony, The Forms of. **19:** 115.
*†Spleenwort, The Dwarf.—Willard N. Clute. **17:** 48.
Spleenwort, The Pinnatifid in Northeastern Ohio.—Ernest W. Vickers. 18: 4.
Spleenworts, The Tall.—Adella Prescott. **20:** 46.
Sporangial Trichomes.—E. J. Durand. **14:** 20.
*Sporelings of Lomaria spicant, Variable.—Amedee Hans. **15:** 33.
*†Star Fern, The.—Willard N. Clute. **12:** 71.

T

Tennessee, The Hartstongue in.—Dr. E. L. Lee. **14:** 82.
Ternate Botrychiums, The Species Conception among the.—Willard N. Clute. **11:** 115.
‡Ternate Botrychium, Two New Varieties of the.—B. D. Gilbert. **11:** 88.

Texas, The Fern-flora of.—Julian Reverchon. **11:** 33.
Third Annual Meeting Botanical Symposium. **14:** 91.
Traveling Ferns.—Willard N. Clute. **17:** 55.
Treasure Trove.—A. B. Klugh. **12:** 26.
Trinomial Fern Names. **19:** 84.
Tropical Ferns in Southern States.—Willard N. Clute. **14:** 22.
Tropical Ferns, The Ecology of Some.—E. B. Copeland. **15:** 102.
*‡Two new Polypodies from Arizona.—Willard N. Clute. **18:** 97.

U

*Underwood, Lucien Marcus, Death of. **15:** 65.

V

Variable Sporelings of Lomaria Spicant.—Amedee Hans. **15:** 33.
Variation in Botrychium ramosum.—Raynal Dodge. **18:** 33. **20:** 48.
Variation in Equisetum, The Measurement of.—Willard N. Clute. **12:** 15
Vermont, Additional Ferns of Dorset. **15:** 49.
Vermont, Botrychium lanceolatum in Northern.—E. J. Winslow. **17:** 105.
Vermont, Dryopteris Filix-mas in.—Tracy E. Hazen. **14:** 25.
Vermont, the Fern Flora of.—W. W. Eggleston. **13:** 33.
Vermont, More About the Ferns of Dorset.—Mrs. E. H. Terry. **15:** 84.

W

Walking Ferns.—Adella Prescott. **19:** 48.
*†Walking Fern, Jamaica.—Willard N. Clute. **12:** 12.
*†Walking Shield Fern, A.—Willard N. Clute. **13:** 78.
Washington, Broad Wood Fern in.—A. S. Foster. **12:** 104.
Washington, Fern-flora of, The.—J. B. Flett. **11:** 79.
Washington, Notes on the Ferns of.—C. T. Fitzpatrick. **12:** 108.
*Waters, Campbell Easter.—B. D. Gilbert. **11:** 75.
Weedy Fernwort, A. **12:** 58.
Wisconsin, Lycopodium porophylum in the Dells of.—E. J. Hill. **19:** 1.
Woodsia, The Rusty, in Cultivation.—Mrs. J. J. Puffer. **14:** 117.

X

*Xiphiopteris, Polypodium or.—Willard N. Clute. **20:** 65.

PTERIDOGRAPHIA

Alaska Fern, **20:** 28.
Apogamy in Pellaea, **20**: 57.
Apospory in Ferns, **18:** 84.
Aspidium simulatum, **17:** 18.
Asplenium ebenoides, **18:** 18.
Asplenium ebenoides in New Jersey, **18:** 116.
Asplenium pinnatifidum in Connecticut, **15:** 15.
Asplenium platyneuron incisum,**17:** 21.
Azolla and Mosquitoes, **18:** 83.
Bermuda Ferns, **20:** 83.
Botrychium dichronum, **16:** 119.
Botrychium dissectum, **18:** 17.
Botrychium, Fertile Spikes of, **18:** 52.
Botrychium Gametophytes of, **18:** 13.
Botrychium lunaria, **16:** 117.
Botrychium lunaria Onondagense, **15:** 58.
Botrychium matricariaefolium tenebrosum, **17:** 19.
Botrychium obliquum, Forms of, **18:** 55.
Botrychium ramosum, **18:** 86.
Botrychium simplex, Habits of, **18:** 87.
Botrychium simplex, Southern Station for, **15:** 17.
Botrychium in Sand, **15:** 82.
Botrychium ternatum f. Alabamense, **17:** 21.
Boulder Fern and Water, The, **15:** 57.
Bracken as a Poisonous Plant, **12:** 57.
Bracken as a Weed, The, **20:** 27.
Bracken, Fragrant, **19:** 32, 55.
Bracken Protected by Law, **15:** 26.
Brake, The Common, as Food, **16:** 86.
Cambium in Ferns, **19:** 54.
Christmas Fern, Crested, **20:** 80.
Cinnamon Fern, Fragrant, **15:** 85.
Cliff-brake, Slender, in Japan, **16:** 117.
Club-mosses, New Panama, **20:** 26.
Coal Ferns, The, **17:** 27.
Complete Set Changes Hands, **18:** 54.
Complete Set of Fern Bulletins, Another, **17:** 115.
Complete Sets, More, **15:** 87.
Correction, A, **18:** 15, 116.
Crested Ferns, **19:** 121.
Crested Marginal Shield Fern, **19:** 123.
Crest-fern, Florida, **15:** 83.
Crest-fern, Spore-bearing in, **17:** 23.
Cyrtomium, Reported Find of, **15:** 89.
Cystopteris, A Forking, **18:** 82.
Cystopteris, An Evergreen, **18,** 85.
Cystopteris fragilis, **13:** 77.
Cystopteris fragilis, Habitats of, **15:** 53.
Cystopteris, Range of, **19:** 128.
Death of Mrs. Horton, **16:** 57.
Death of J. G Lemmon, **17:** 21.
Death of Sarah Frances Price, **12:** 25.
Dicksonia, Distribution of, **18:** 115.
Dicksonia, Hairs of, **17:** 25.
Dorset Ferns, Additional, **15:** 49.
Drouth, Ferns and, **15:** 55.
Eared Walking Fern, The, **15:** 86.
Eaton, A. A., Writings of, **17:** 23.
Equisetum, A New, **20:** 76.
Equisetum for Decorations, **15:** 89.
Evergreen Cystopteris, An, **18:** 85.
Fall Fruiting of Osmunda, **16:** 121.
Fern, A Curious Panama, **19:** 89.
Fern Bulletin, Another Complete Set, **17**: 115.
Fern Colony, An Interesting, **17:** 18.
Fern Flora of Indiana, **20:** 81.
Fern, Christmas, Crested, **20:** 80.
Fern Garden, The, **15:** 51.
Fern Genera, **16:** 88.
Fern Genera and Species, **15:** 56.
Fern Mycorhizas, **17:** 24.
Fern Names, Changes in, **16:** 120.
Fern Names, Trinomial, **19:** 84.

Fern Notes from New York, **19:** 15
Fern Pest, A New, **20:** 56.
Fern Pests, Additional, **20:** 76.
Fern, Resurrection, Reproduction of, **15:** 25.
Fern Spores, Color of, **17:** 22.
Fern Sports, Two New, **20:** 78.
Fern Study, A New Phase of, **18:** 18.
Ferns and Drouth, **15:** 55
Ferns and Lime, **15:** 55.
Ferns, Number of, **20:** 76.
Ferns as Weeds, **20:** 82.
Ferns as Food Preservers, **16:** 87.
Ferns, Bermuda, **20:** 93.
Ferns, Cambium in, **19,** 54.
Ferns, Crested, **19,** 121.
Ferns, Edible, **15:** 50.
Ferns, Fertilization in, **19,** 86.
Ferns, Florida, New Stations for, **20:** 75.
Ferns found fossil, Living, **19:** 123.
Ferns for the House, **19:** 119.
Ferns, Hybrid, **19,** 18.
Ferns in Bottles, **11:** 120; **20:** 74.
Ferns of Ohio, **16:** 121.
Ferns of the Bad Lands, **18:** 16.
Ferns of the Malay Region, **17:** 115.
Ferns, Permian, **17:** 117.
Ferns, New Southwestern, **20:** 79.
Ferns, Polynomial, **15:** 84.
Ferns weighing a ton, **20:** 64.
Fertile Panicles, Three, **15:** 49.
Fertile Spike of Ophioglossum, **17:** 114.
Filmy Ferns and Moisture, **17:** 91.
Filmy Ferns in Dry Regions, **20:** 26.
Florida Crest-fern, Hardiness of, **15:** 13.
Forked Liquorice Fern, **19:** 53.
Forms of Onoclea sensibilis, The, **15:** 85.
Fossil Ferns, **17:** 118.
Fossil Ferns are Rare, **15:** 54.
Fresh Fronds, Packing, **15:** 52.
Gametophytes of Botrychium, **18:** 13.
Genera and Species, Fern, **15:** 56.
Genera, Fern, **16:** 88.
Generic Relationships, **16:** 25.
Gilbert, B. D. Herbarium of, **17:** 115.
Goldie, James, Death of, **20:** 80.
Hardiness of Florida Crest-fern, **15:** 13.
Hart, J. H., Death of, **12:** 54.
Hart's-tongue, Rooting at the Tip, **15:** 88.
Horton, Mrs., Death of, **16:** 57.
Hybrid Ferns, **19:** 18.
Ladder Fern, The, **17:** 25.
Lady Fern, The, **18:** 14.
Lady Fern, Red-stiped, The, **17:** 113.
Leaf Shoots, **17:** 22.
Lemmon, J. G., Death of, **17:** 21.
Light and Germination of Spores, **16:** 24.
Lime, Ferns and, **15:** 55.
Liquorice Fern, Forked, **19:** 53.
Lomaria spicant's Variable Sporelings, **16:** 117.
Lycopodium clavatum, Forms of, **18:** 51.
Lycopodium clavatum brevispicatum, **17:** 20.
Lycopodium lucidulum porophylum **20:** 58.
Lycopodium Selago f. patens, **17:** 20.
Lygodium as a Decoration, **18:** 53.
Mailing Small Ferns, **15:** 86.
Maine Ferns Free, **18:** 51.
Malay Region, Ferns of, **17:** 115.
Marginal Shield Fern, Crested, **19:** 123.
Marsh Fern, A Fragrant, **18,** 87.
Marsilia Leaves, A Fragrant, **18:** 87
Nephrodium Boottii, a Hybrid, **15:** 53.
Nephrodium cristatum, Variable, **15:** 83.
Nephrodium marginale f. Davenportii, **18:** 16.
Nephrodium patens, **15:** 89.
Nephrodium spinulosum anadenum **17:** 20.
Nephrolepis, **17:** 117, 118.
Nephrolepis Dreyerii, **19:** 19.
Nephrolepis magnifica, **17:** 115.
Nephrolepis Marshalli, **19:** 19.
Nephrolepis muscosa, **19:** 89.
Nephrolepis Roosevelt, **18:** 83.
Nephrolepissimus, **19:** 89.
Nephrolepis, Stolons of, **18:** 54.

Nephrolepis, The Tubers of, **15:** 84.
New Station for Mountain Spleenwort, **17:** 112.
Nomenclature, Absurdity in, **15:** 57.
Nomenclature, Some Curious, **16:** 119.
Ohio, Ferns of, **16:** 121.
Onoclea sensibilis in the South, **15:** 50.
Onoclea sensibilis obtusilobata, **17:** 19.
Onoclea sensibilis, The Forms of, **15:** 85.
Ophioglossum, Development of, **16:** 24.
Ophioglossum, The Fertile Spike of, **17:** 114.
Osmunda, An Aberrant, **18:** 53.
Osmunda cinnamomea f. frondosa, **17:** 18.
Osmunda cinnamomea incisa, **17:** 19.
Osmunda, Fall Fruiting of, **16:** 121.
Osmunda, Variant, **17:** 112.
Ostrich Fern, Sex in, **19:** 53.
Packing Fresh Fronds, **15:** 52.
Panama Club Mosses, New, **20:** 26.
Panama Fern, A Curious, **19:** 89.
Pellaea, Apogamy in, **20:** 57.
Pellaea atropurpurea var. Bushii, **18:** 15.
Pellaea gracilis on Sandstone, **19:** 84.
Permian Ferns, **17:** 117.
Pollination and Fertilization, **17:** 119.
Polynomial Ferns, **15:** 84.
Polypodium aureum Mandianum, **17:** 24.
Polypodium vulgare auritum, **15:** 86.
Polypodium vulgare f. bifido—cristatum, **18:** 15.
Polypody, A New Form of, **16:** 91.
Polypody, Sporting of, **19:** 85.
Polypody, The Virtues of, **19:** 18.
Polystichum acrostichoides recurvatum, **16:** 15.
Polystichum acrostichum multifidum, **18:** 55.
Pteris serrulata, Range of, **15:** 87.
Red-stiped Lady Fern, **17:** 113.
Resurection Fern, Reproduction of, **15:** 25.
Schizaea, Distribution of, **19:** 88.
Schizaea pusilla in Newfoundland, **17:** 112.
Sex in the Ostrich Fern, **19:** 53.
Shelter Island Ferns, **17:** 114.
Spleenwort, Black, in America, **19:** 121.
Spleenwort, Mountain, New Station for, **17:** 112.
Spores, Color of Fern, **17:** 22.
Spore-bearing in Crest Fern, **17:** 23.
Sporophyll Zones, **20:** 59.
Spores, Light and Germination of, **16:** 24.
Stipe or Stipes, **20:** 57.
Stolons of Nephrolepis, The, **18:** 54.
Taenitis, Affinities of, **20:** 59.
Tree Ferns, **17:** 116.
Trinomial Fern Names, **19:** 84.
Tubers of Nephrolepis, The, **15:** 84.
Variant Osmunda, **17:** 112.
Wariant Osmunda, **17:** 112.
Walking Fern, The Eared, **15:** 86.
Water Clover, The, **15:** 44.
Water, The Boulder Fern and, **15:** 57.
Wood Ferns Grouped Anew, **19:** 16.
Woodsia Oregana, **16:** 106.
Woodwardia on Cape Cod, **20:** 28.

LIST OF SPECIES

Acrostichum
  alatum, **11:** 58.
  aureum, **11:** 23, 59. **12:** 35, 45. **14:** 56.
  cerviuum, **11:** 59.
  chartaceum, **11:** 58.
  crinitum, **11:** 58.
  excelsum, **14:** 121.
  huacsaro, **11:** 59.
  inaequalifolium, **11:** 59.
  latifolium, **11:** 59.
  lepidotum, **11:** 59.
  lomarioides, **11:** 23, 59. **12:** 45, **14:** 57.
  nicotinaefolium, **11:** 59.
  osmundaceum, **11:** 59.
  pallidum, **11:** 58.
  peltatum, **11:** 59.
  simplex, **11:** 58.
  sorbifolium, **14:** 57.
  squamosum, **11:** 59.
  tectum, **11:** 59.
  viscosum, **11:** 59.
Adiantum
  Americanum, **20:** 72.
  capillus-veneris, **11:** 3, 35. **12:** 6, 36, 66, 110, 121. **13:** 8, 58, 80. **14:** 57, 20, 83.
  elongatum, **14:** 57.
  concinum, **13:** 80.
  Farleyense, **20:** 79.
  emarginatum, **12:** 6. **14:** 57.
  hispidulum, **13:** 9. **14:** 57.
  f. strictum, **13:** 109.
  hispidum, **13:** 60.
  modestum, **11:** 39. **14:** 57.
  pedatum, **11:** 3, 67, 81, 100. **12:** 6, 67, 75, 99, 109, 110. **13:** 8, 24, 36. **14:** 2, 57, 67, 101. **15:** 5, **17:** 70. **19:** 109. **20:** 9, 37, 53, 73.
  aleuticum, **14:** 57.
  rangiferinum, **14:** 57.
  reniforme, **13:** *†49.
  tenerum, **12:** 36, 45. **14:** 58, 110. **20:** 78.
  tricholepis, **11:** 35. **12:** 44. **14:** 58.
Anemia
  adiantifolia, **11:** 22, 37. **12:** 35, 45, **13:** 120.
  Brandegeia, **13:** 20.
  Mexicana, **11:** 37. **13:** 120.
Angiopteris
  sensibilis, **20:** 71.
Antrophyum
  lanceolatum, **11:** 58.
  lineatum, **11:** 58.
Aspidium
  cristatum, **13:** 25. **15:** 79.
  juglandifolium, **11:** 35. **17:** 4.
  simulatum, **17:** 18.
  spinulosum, **13:** 24. **19:** 5.
    varieties **15:** ‡80.
  thelypteris, **13:** 24. **19:** 5.
  trifoliatum, **11:** 35. **12:** 45.
Asplenium
  acrostichoides, **15:** 7. **20:** 11.
  alternans, **19:** ‡33, 36, 38, 69
  Andrewsii, **19:** *‡3.
  angustifolium, **11:** 68, 100. **12:** 67. **13:** 11, 37. **14:** 4, 58, 68. **15:** 6. **19:** 110. **20:** 10, 38, 46.
  auritum, **12:** 37, 63. **14:** 58.
  Biscaynianum, **12:** 45.
  Bradleyi, **11:** 100. **12:** 67. **13:** 11. **14:** 58. **17:** 43, 70.
  cicutarium, **12:** 37. **14:** 58.
  cyclosorum, **17:** 5.
  dentatum, **12:** 37, 46. **14:** 58.
  ebeneum, **11:** 4, 35, 68, 100. **12:** 36, 67, 75. **13:** 11, 37, 56, 68. **14:** 86, 101. **16:** 102. **17:** 70. **20:** 75.
    f. furcatum, **17:** *‡88.
    Hortonae, **14:** 86.
    incisum, **12:** 75.
    proliferum, **14:** 86.
    serratum, **14:** 86. **17:** 70.

ebenoides, **11:** 100. **12:** 26, 68. **13:** 37, 100. **14:** 3, 86, 111. **15:** 6. **16:** 111. **17:** 71, *‡88. **18:** 18, 116. **19:** 68, 110. **20:** 38.
Halleri, **18:** *103.
filix-foemina, **11:** 35, 68, 100. **13:** 24. **14:** 101. **15:** 7. **19:** 5. **20:** 11, 53.
Ferissi, **16:** *‡1, 17. **17:** 4. **19:** ‡33, 69.
firmum, **12:** 37. **14:** 86.
fontanum, **15:** 11. **17:** 71. **18:** *103
Glenniei, **14:** 86. **17:** 6. **18:** *101.
lanceum, **12:** 37, 79.
monanthemum, **14:** 86. **17:** 5.
montanum, **11:** 100. **12:** 68, 118. **13:** 11. **14:** 4, 86. **15:** 7. **17:** 72, 97, 112. **20:** 10.
muticum, **11:** 77. **12:** 37. **14:** 86.
myriophyllum, **12:** 36, 46. **14:** 87, 109.
  biscaynianum, **14:** 87.
parvulum, **11:** 35, 78. **12:** 36, 68, 75. **13:** 11, 80. **14:** 87. **15:** 6, **17:** 5. **18:** 4. **19:** 110. **20:** 37.
  grandidentatum, **20:** 79.
pinatifidum, **11:** 14. **12:** 68. **13:** 10.
platyneuron, **12:** 81. **14:** 3. **15:** 5. **19:** 110. **20:** 10, 38.
pumilum, **17:** 48.
rupium, **20:** 79.
ruta-muraria, **11:** 100. **12:** 68, 75, 118. **13:** 37. **14:** 4, 68, 87. **15:** 6. **17:** 72. **19:** 110. **20:** 10.
septentrionale, **12:** 82. **14:** 87.
serratum, **12:** 36, 46. **14:** 87.
trichomanes, **11:** 35, 82, 100. **12:** 19, 68, 75, 99. **13:** 11, 38. **14:** 3, 68, 87, 101. **15:** 6. **17:** 5, 73. **19:** 110. **20:** 10, 38, 82.
  incisum, **14:** 87.
  x ruta-muraria, **16:** *†46.
thelypteroides, **11:** 68. **12:** 68. **14:** 101. **20:** 47.
vespertinum, **12:** 9. **14:** 88.
viride, **12:** 9. **14:** 88. **11:** 82. **13:** 38. **14:** 68, 88.
Athyrium
acrostichoides, **17:** 73.
cyclosorum, **11:** 82. **12:** 10. **13:** 76. **14:** 88.
filix-foemina, **11:** 4, 82, 100. **12:** 9, 37, 68, 99. **13:** 12, 38, 56. **14:** 4, 68, 88. **17:** 73. **18:** 12. **19:** 111. **20:** 38.
  f. pectinatum, **13:** 101.
thelypteroides, **11:** 4, 100. **13:** 12, 38. **14:** 4, 68, 88. **19:** 69, 110. **20:** 38.
Azolla
Caroliniana, **11:** 5, 38, 71, 83, 104. **12:** 38, 110, 120. **14:** 73. **15:** 12. **16:** 16. **19:** 113. **20:** 26, 41, 47.
filiculoides, **12:** 12. **16:** 16.
Blechnum
occidentale, **13:** 81.
serrulatum, **11:** 21. **12:** 36, 46. **14:** 89.
spicant,
  bipinatum, **19:** *‡72.
Botrychium
angustisegmentum, **17:** 69.
biternatum, **11:** 3, 117. **13:** 87. 117.
biternatum obliquum, **13:** 87.
boreale, **13:** 117.
Coulteri, **12:** 4, 82, 97.
dissectum, **17:** 68. **18:** 17. **19:** 108.
lanceolatum, **11:** 16, 81, 98. **12:** 19. **13:** 26, 117. **14:** 7, 66, 99. **15:** 3. **16:** 10, 31. **17:** 105. **20:** 78.
lunaria, **12:** 97. **13:** 36, 117. **14:** 66, 80. **15:** 4. **20:** 14.
  onondagense, **14:** *‡80.
lunariodes, **13:** 6.
matricariae, **13:** 36. **16:** 103.
matricariaefolium, **11:** 15, 81, 98. **12:** 19, 36, 77, 117. **14:** 11, 48, 66, 98. **15:** 4, 82. **16:** 84, 103. **17:** 7, 69. **20:** 15.
  tenebrosum, **13:** 117.
obliquum, **11:** 3, 67, 99. **12:** 34. **13:** 6, 25, 36. **14:** 7, 98. **15:** 3. **16:** 84, 103. **17:** 8, 68, †101. **19:** 6, 108. **20:** 15, 36, 75.
  dissectum, **11:** 99. **13:** 36. **14:** 7, 99. **16:** 85, 103. **17:** 8. **20:** 15.
  elongatum, **11:** 88, 99.
  Habereri, **11:** 88, 99.
  intermedium, **11:** 99. **13:** 36. **14:** 99. **16:** 103.

    matricarioides, **11:** 99.
    Oneidense, **11:** 99. **16:** 103.
    tenuifolium, **11:** 99.
  occidentale, **11:** 81. **12:** 97.
  Onondagense, **11:** 99.
  pumicola, **13:** 117.
  ramosum, **18:** 33, 86. **20:** 48.
  silaifolium, **12:** 4.
  simplex, **11:** 81, 99. **12:** 4. **13:** 36, 117. **14:** 66, 84, 98. **15:** 17. **16:** 103. **17:** 69. **18:** 87. **19:** *11. **20:** 14.
    fallax, **13:** 75.
  tenebrosum, **11:** 99. **13:** 36. **14:** 49. **17:** 69.
  ternatum, **11:** 72.
    dissectum, **15:** 49.
  ternatum obliquum, **11:** 116. **12:** 65. **13:** 118. **14:** 66.
    Coulteri, **11:** 116. **13:** 118.
    dissectum, **11:** 116. **13:** 118.
    intermedium, **11:** 116. **13:** 118.
    matricariae, **11:** 116. **13:** 118.
    occidentale, **11:** 116.
    Oneidense, **11:** 116. **13:** 118.
    robustum, **11:** 116. **13:** 118.
    silaifolium, **11:** 116. **13:** 118.
    tenuifolium, **11:** 116. **13:** 118.
    silaifolium, **11:** 117.
  Virginianum, **11:** 3, 34, 67, 81, 99. **12:** 34, 65, 76, 97. **13:** 6, 25, 55, 118, 121. **14:** 7, 42, 66, 99. **15:** 4. **17:** 69. **19:** 48, 108. **20:** 15, 36, 53.
  gracile, **13:** 118.

Camptosorus
  rhizophyllus, **11:** 68, 100. **12:** 69, 76. **13:** 12, 38. **14:** 4, 69, 89, 101. **15:** 7, 86. **16:** 102. **17:** 73. **19:** 111. **20:** 11, 38, 56.
    intermedia, **14:** †89.

Ceratopteris
  thalictroides, **11:** 3, 13. **12:** 35. **14:** 56.

Ceropteris
    triangularis, **12:** 58.

Cheilanthes
  Alabamensis, **11:** 35. **12:** 36. **13:** 9. **14:** 89.
  amoena, **12:** 7.
  argentea, **14:** 89.
  Californica, **12:** 7. **14:** 89.
    amoena, **14:** †89.
  Clevelandii, **14:** 89.
  Cooperae, **12:** 7. **14:** 89.
  Eatonii, **11:** 35. **14:** 89. **17:** 34.
  Feei, **17:** 3. **20:** 37.
  Fendleri, **11:** 35. **12:** 8. **14:** 89. **17:** 3.
  fibrillosa, **12:** 7. **14:** 90.
  gracillima, **11:** 82. **12:** 7, 99, 109. **14:** 3, 90.
  lanosa, **12:** 81. **19:** 109. **20:** 37.
  lanuginosa, **11:** 35, 67, 82. **12:** 76, 99. **14:** 90.
  lendigera, **14:** 188. **17:** 4.
  leucopoda, **11:** 35. **14:** 118.
  Lindheimeri, **11:** 35. **14:** 118. **17:** 3.
  Matthewsi, **13:** 81.
  microphylla, **11:** 35. **12:** 36. **14:** 118.
  Moritziana, **12:** 44. **14:** 118.
  myriophylla, **11:** 35. **12:** 8, 82. **14:** 118.
  Parishii, **12:** 7. **14:** 118. **16:** 35.
  Pringlei, **14:** 118.
  sonorensis, **20:** 79.
  tomentosa, **11:** 35. **13:** 10. **14:** 118. **17:** 3.
  vestita, **11:** 100. **12:** 69. **13:** 10 **14:** 119. **17:** 73.
  viscida, **12:** 7. **14:** 119.
  Wrightii, **11:** 35. **14:** 119. **17:** 3.

Cryptogramma
  acrostichoides, **11:** 82. **12:** 8, 99. **14:** 3, 67, 119. **20:** 10.
  gracilis, **14:** 119.
  Stelleri, **20:** 10.

Cystopteris
  bulbifera, **11:** 69, 101. **12:** 69, 76. **13:** 38, *‡99. **14:** 5, 71, 100. 119. **15:** 10, 16, 103. **16:** 102, **17:** 3. **19:** 112. **20:** 12, 40.
  fragilis, **11:** 69, 83, 100. **12:** 11, 69, 76, 98. **13:** 38, 77. **14:** 5, 71, 100, 120. **15:** 10, 53. **17:** 5, 74. **18:** 16. **19:** 5, 112, 128. **20:** 13, 40, 71.
    angustata, **14:** †120.
    dentata, **14**, 100, †120.
    laciniata, **14:** †120.
    Mackayi, **14:** 120.
    magnasora, **14:** †120.
    sempervirens, **18:** 85.
    tenuifolia, **16:** *‡75.
  Montana, **14:** 7, 120.

Cyrtomium
- falcatum, **15:** 89. **20:** 78.
  - Rockfordianum, **20:** 78.

Davallia
- clavata, **12:** 37. **14:** 120.
- Novae Zelandiae, **16:** 43.

Dicksonia
- antarctica, **16:** 44.
- pilosiuscula, **11:** 101. **12:** 69. **13:** 14, 38. **14:** 71, 99. **17:** 25, 74.
  - nana, **13:** 101.
  - Poyseri, **19:** *‡7.
- punctilobula, **14:** 5, 120. **15:** 10. **18:** 67, 81, 115. **19:** 6, 15, 113. **20:** 13, 40.
  - cristata, **14:** †120.
  - schizophylla, **14:** †120.

Doryopteris
- pedata, **16:** *†33.
- ludens, **18:** *†43.

Drymoglossum
- carnosum, **19:** *†65.

Dryopteris
- cristata x marginalis, **16:** 97.
- filix-mas, **14:** 25.
- fragrans, **19:** 80.
- Goldieana, **11:** 16.
- thelypteris, **11:** 16.

Equisetum
- arvense, **11:** 70, 84, 103. **12:** 12. **13:** 39. **14:** 8. 72, 102. **15:** 12. **16:** 17. **17:** 80. **19:** 6. **20:** 15, 41, 83.
  - campestre, **12:** 100. **19:** 113.
- Ferrissi, **12:** 20. **20:** 41.
- fluviatile, **11:** 70, 84, 103. **12:** 99. **13:** 39. **14:** 9, 72, 102. **15:** 12. **16:** 17. **17:** 80. **19:** 6, 113. **20:** 16, 41.
  - intermedium, **16:** 18.
  - limosum, **16:** 18.
- Funstoni, **11:** 8, 10. **12:** 12. **16:** 18.
  - caespitosum, **11:** 11.
  - nudum, **11:** 11.
  - polystachyum, **11:** 12.
  - ramosum, **11:** 12.
- hyemale, **11:** 8, 70, 73, 84, 103. **12:** 13. **13:** 39, 85. **14:** 9, 72, 102. **15:** 12, 82, 89. **16:** 18, 113. **19:** 114. **20:** 17, 41, 77.
  - affine, **11:** 111. **17:** 80.
  - Californicum, **11:** 113.
  - Doelli, **11:** 114.
  - Drummondi, **11:** 111.
  - herbaceum, **11:** 108.
  - intermedium, **11:** 103, 108. **16:** 18. **20:** 17, 77.
  - pumilum, **11:** 109.
  - ramosum, **11:** 112.
  - robustum, **11:** 112. **13:** 14. **16:** 18. **17:** 80. **20:** 77.
  - Sukesdorfi, **11:** 110.
  - Texanum, **11:** 108.
- Kansanum, **20:** 78.
- laevigatum, **11:** 5, 8, 37, 40, 70, 84. **12:** 13, 100. **15:** 12. **16:** 19. **17:** 81. **19:** 114. **20:** 16, 14 77.
  - caespitosum, **11:** 43.
  - elatum, **11:** 43.
  - polystachyum, **11:** 44.
  - ramosum, **11:** 43.
  - scabrellum, **11:** 42.
  - variegatoides, **11:** 43.
- litorale, **11:** 84. **13:** 39. **14:** 72, 102. **16:** 19. **17:** 81. **20:** 16.
  - elatius, **17:** 81.
- palustre, **11:** 84, 103. **12:** 20. **13:** 39. **14:** 9, 72, 102. **16:** 19. **20:** 16, 41.
  - fallax, **11:** 84.
- pratense, **11:** 70. **13:** 39. **14:** 8, 72, 102. **15:** 11. **16:** 19. **17:** 81. **20:** 16.
- ramosissimum, **11:** 8, 9. **12:** 12.
  - annuliferum, **11:** 10.
- robustum, **11:** 5, 8, 16, 37, 70, 84. **12:** 13, 100. **15:** 12. **19:** 114. **20:** 41.

Equisetum
- scirpoides, **11:** 8, 44, 103. **12:** 42, 100. **13:** 20, 39. **14:** 9, 72, 102. **15:** 12. **16:** 19. **17:** 81, **20:** 17, 42.
- sylvaticum, **11:** 70, 103. **13:** 39. **14:** 9, 72, 102. **15:** 12. **16:** 19. **17:** 81. **19:** 6. **20:** 16.
  - serotinum, **17:** 81
- telmateia, **12:** 109. **16:** 20. **20:** 16.
  - Braunii, **11:** 84. **12:** 12.
- trachyondon, **11:** 7.
- variegatum, **11:** 8, 9, 103. **12:** 23, 100. **13:** 39. **14:** 9, 72, 102. **15:** 12. **16:** 20. **17:** 82. **19:** 114. **20:** 17, 44.

Alaskanum, **11:** 84. **12:** 39. **16:** 20.
genuinum, **12:** 40.
Jesupi, **11:** 7. **12:** 24. **13:** 39.
Nelsoni, **12:** 41.
Fadyenia
prolifera, **11:** †54. **12:** 112.
Gleichenia
Cunninghami, **16:** 45.
dicarpa, **16:** 45.
Gymnogramme
calomelanos, **11:** 57.
Ehrenbergiana, **11:** 36.
gracilis, 11: 57.
hispida, **14:** 121. **17:** 3.
lanceolata, **20:** *†43.
rufa, **11:** 57.
sulphurea, **11:** 58.
tartarea, **11:** 57. **13:** 81.
triangulata, **11:** 57.
triangularis, **11:** 46, 81. **12:** 5, 77. **14:** 121. **17:** 3.
viscosa, **14:** 121.
trifoliata, **11:** 57.
Hemionitis
arifolia, **18:** *†76.
palmata, **11:** *†71.
Hemigramma
latifolia, **19:** *†46.
Hemitelia
horrida, **17:** 116.
Hymenophyllum
denticulatum, **17:** *106.
flabellatum, **16:** 44.
Franklinianum, **16:** 44.
Javanicum, **16:** 44.
pulcherrimum, **16:** 44.
scabrum, **16:** 44.
Hypolepis
repens, **15:** 19. **16:** 38.
Isoetes
Amesii, **11:** 103.
Bolanderi, **11:** 85. **12:** 14, 101. **16:** 54.
pygmaea, **16:** 54.
Sonnei, **16:** 54.
Butleri, **13:** 16. **16:** 54. **20:** 43.
immaculata, **16:** 54.
Canadensis, **14:** 10, 74. **16:** 54.
Amesii, **16:** 54.
Robinsii, **16:** 54.
Dodgei, **14:** 104. **17:** 82.
Braunii, **11:** 85, 103. **13:** 40. **14:** 10, 74. **16:** 54. **17:** 82. **19:** 7. **20:** 19.
Boottii, **16:** 55.
Flettii, **16:** 55.
maritima, **16:** 55.
robusta, **16:** 55.
Canadensis, **13:** 40.
Flettii, **11:** 85. **13:** 51.
fontana, **13:** 52.
maritima, **13:** 52.
muricata, **11:** 103. **14:** 10, 104.
robusta, **13:** 40. **17:** 82.
Engelmanni, **11:** 103. **14:** 10. **16:** 55. **17:** 82.
Caroliniana, **16:** 55.
fontana, **16:** 55. **17:** 82.
Georgiana, **13:** 16. **16:** 55.
gracilis, **16:** 55. **17:** 82.
flaccida, **12:** 38, 46. **13:** 16.
rigida, **12:** 38.
foveolata, **14:** 9. **16:** 55.
plenospora, **16:** 55.
Gravesii, **14:** 10. **16:** 55.
Harveyi, **14:** 104.
heiroglyphica, **14:** 104. **16:** 55.
heterospora, **14:** 104.
Howelli, **11:** 85. **12:** 14. **16:** 56.
Piperi, **16:** 56.
lacustris, **17:** 82.
Macounii, **16:** 56.
macrospora, **11:** 103. **13:** 40. **14:** 74. **16:** 56. **20:** 19.
heterospora, **16:** 56.
paupercula, **16:** 56.
melanopoda, **11:** 38, 70. **12:** 14. **16:** 56. **20:** 43.
melanospora, **13:** 16. **16:** 56.
minima, **11:** 85. **16:** 56.
Nuttali, **11:** 85. **12:** 14. **16:** 56.
occidentalis, **12:** 14.
Orcutti, **12:** 15. **16:** 56.
paupercula, **11:** 85.
Piperi, **11:** 85. **13:** 51.
pygmaea, **12:** 14.
riparia, **16:** 57. **17:** 86.
saccharata, **15:** 18. **16:** 57.
Amesii, **14:** 9.
Palmeri, **16:** 57.
reticulata, **16:** 57.
truncata, **16:** 57.
Tuckermani, **14:** 9, 104.
borealis, **13:** 40. **14:** 104. **16:** 57.
Harveyi, **16:** 57.
valida, **16:** 57. **17:** 82.
Lindsaya
trichomanoides, **16:** 44.

Llavea
cordifolia, **13:** 81.
Lomaria
alpina, **16:** 43.
fluviatilis, **16:** 43.
Pattersoni, **16:** 42.
spicant, **11:** 17, 82. **12:** 9, 109. **15:** 19, *33.
  bipinnatum, **14:** 91. **15:** 19.
  serratum, **15:** 19.
vulcanica, **16:** 42.
Lonchitis
aurita, **18:** 111.
Lycopodium
adpressum polyclavatum, **17:** 83.
alopecuriodes, **11:** 5, 103. **12:** 38, 81. **13:** 14, 88. **16:** 20. **17:** 79, 84.
  adpressum, **11:** 5, 37, 104. **12:** 38. **13:** 14. **16:** 20.
    polyclavatum, **11:** 104. **16:** 20. **17:** *45, *83. **19:** 56.
  pinnatum, **13:** 14. **16:** 20.
alpinum, **11:** 85. **16:** 21. **20:** 18.
annotinum, **11:** 84, 104. **12:** 1, 110. **13:** 39. **14:** 8, 73, 103. **15:** 13. **16:** 21. **17:** 79. **19:** 6. **20:** 18.
  pungeus, **11:** 104. **13:** 39. **14:** 103. **16:** 21. **19:** 6.
Carolinianum, **11:** 5. **12:** 38, 46, 81. **13:** 15. **16:** 21. **17:** 84.
cernuum, **12:** 38. **13:** 15. **16:** 21.
chamaecyparissus, **14:** 103.
Chapmanii, **12:** 46. **17:** 79.
clavatum, **11:** 5, 70, 84, 104. **13:** 39. **14:** 8, 73, 103. **16:** 21. **17:** 79. **19:** 6. **20:** 18.
  brevispicatum, **17:** 20.
  monostachyon, **13:** 39. **14:** 8, 103. **16:** 21. **19:** 6. **20:** 18.
complanatum, **11:** 70. **12:** 70, 101. **13:** 39. **14:** 8, 73, 103. **15:** 13. **16:** 22. **17:** 7, 114. **20:** 18.
chamaecyparissus, **16:** 22.
  flabelliforme, **11:** 104. **14:** 103. **17:** 79. **16:** †22. **19:** 7. **20:** 19.
  tristachyon, **14:** 73.
  Wibbii, **11:** 84. **16:** †22.
inundatum, **11:** 84, 104. **13:** 40. **14:** 8, 73, 103. **15:** 13. **16:** 22, **17:** 79. **19:** 6, 114. **20:** 18, 42
  biglovii, **11:** 104. **13:** 40. **16:** 22. **17:** 79.
lucidulum, **11:** 12, 46, 70, 104.. **13:** 40, 48. **14:** 8, 73, 102. **15:** 12. **16:** 22. **17:** 80. **19:** 62, 114. **20:** 17, 42.
  occidentale, **16:** 22.
  porophylum, **16:** 22. **19:** †6. **20:** 10, 58.
obscurum, **11:** 104. **12:** 70, 101. **13:** 40. **14:** 8, 73, 103. **15:** 13. **16:** 23. **17:** 80. **19:** 114. **20:** 18.
  dendroideum, **19:** 6. **20:** 18.
porophilum, **11:** 47. **19:** 1, 114.
sabinaefolium, **13:** 40. ~~**40:**~~ 14 73, 103. **15:** 70. **16:** 23. **20:** 18.
selago, **11:** 47, 84, 104. **12:** 101. **13:** 40, 48. **14:** 7, 72, 102. **16:** 23. **17:** 80. **20:** 17, 42.
  patens, **17:** †20.
  lucidulum, **13:** 48.
Sitchense, **11:** 85, 104. **14:** 73, 103. **16:** 23.
tristachyon, **17:** 80.
tristachyum, **11:** 104. **13:** 40. **14:** 8. **20:** 19.
  Sharonense, **18:** ‡9.
Lygodium
Japonicum, **13:** 7, 59, 108, 120.
palmatum, **11:** 72, 100. **12:** 35, 66, 81. **13:** 7, 120. **14:** 6. **17:** 70.
Marsilia
macropoda, **11:** 38. **16:** 16.
quadrifolia, **14:** 7, 10. **15:** 44. **16:** 16. **17:** 78. **20:** 82.
tennifolia, **11:** 38.
uncinata, **11:** 5, 38. **12:** 58. **16:** 16.
vestita, **11:** 38, 70, 83. **12:** 11, 38, 58, 99. **15:** 24. **16:** 17.
  tenuifolia, **16:** 17.
Meniscium
angustifolium, **11:** 57.
reticulatum, **11:** 57, 72. **12:** 35, 46. **15:** 19.
Nephrodium
acrostichoides, **15:** 7.
amplum, **12:** 37, 47. **15:** 19.
Ashenborniana, **15:** 45.
Boottii, **11:** 101. **13:** 37, 86. **14:** 5, 70, 101. **15:** 8, 19. **16:** 102. **19:** 112. **20:** 12.

multiflorum, **15**: 20.
candida, **15: 45.**
Clintonianum x intermedium, **17**: 34.
x marginale, **17**: 34.
x spinulosum, **17**: 34.
contermimum, **12**: 37.
stragosum, **15**: 20.
cristatum, **11**: 69, 100. **13**: 37. **14**: 5. 70, 100. **15**: 8, 20. **17**: 13, 74. **19**: 111. **20**: 12, 39, 53.
Clintonianum, **11**: 101. **13**: 37. **14**: 5, 70, 100. **15**: 8, 20, 83. **17**: 74. **20**: 12.
silvaticum, **16**: *‡133.
Lancastriense, **15**: †20.
marginale, **15**: 20.
x Goldieanum, **17**: 74.
x intermedium, **17**: 34.
x marginale, **14**: 5. **15**: 20. **16**: 102. **17**: 34, 74.
x spinulosum, **15**: 20. **17**: 34.
intermedium, **17**: 74.
deltoideum, **20**: *†20.
Ehrenbergiana, **11**: 36.
filix-mas, **11**: 83. **12**: 10, 98. **14**: 69. **15**: 20. **17**: 4, 5. **19**: *97, 112. **20**: 12.
Floridanum, **11**: 4, 36. **12**: 37. **13**: 13, 58, 109. **15**: 13, 21.
fragrans, **11**: 101. **13**: 37. **14**: **69,** 100. **15**: 21. **20**: 11.
aquilonare, **15**: †21.
Goldieanum, **11**: 69, 101. **12**: 69. **13**: 37. **14**: 5, 70, 100. **15**: 9, 21. **16**: 102. **17**: 13, 75. **19**: 112. **20**: 12, 25, 39, 80.
celsum, **15**: †21.
x spinulosum, **17**: 75.
Lemmoni, **15**: 46.
marginale, **11**: 69, 101. **12**: 69. **13**: 13, 37. **14**: 5, 69, 100. **15**: 9, 21. **17**: 75. **19**: *50, 112. **20**: 12, 39, 53.
Davenporti, **19**: 123.
elegans. **19**: *†50.
pinnatifidum, **19**: *†50.
Trallae, **19**: *†52.
x Davenportii, **18**: 16.
Mexicana, **18**: 104.
molle. **11**: 105. **13**: 108. **15**: 21. **16**: *†49.
Nevadense, **12**: 10. **15**: 22.
Noveboracense, **11**: 69, 101. **12**: 69. **13**: 12, 37. **14**: 5, 69, 100. **15**: 8, †22. **17**: 42, 75. **19**: 111. **20**: 11, 39, 82.
oreopteris, **11**: 82. **15**: 22.
patens, **11**: 4, 14, 21, 22, 23, 36. **12**: 10, 37. **13**: 13, 58. **14**: 110. **15**: 22, 89. **16**: *†49.
glandulosa, **15**: †22.
patula, **17**: 5.
patulum, **15**: 22.
Pittsfordense, **13**: 37, 88.
Pittsfordensis, **12**: 106.
reptans, **12**: 46. **15**: 22.
rigidum-argutum, **12**: 10. **15**: 23.
setigerum, **15**: 23.
simulatum, **11**: 101. **12**: 57. **13**: 37. **14**: 4, 100. **15**: 23. **16**: 104. **17**: 75. **20**: 11.
sinuata, crenata, **15**: 46.
spinulosum, **11**: 69, 101. 106. **12**: 69, 98, 109. **13**: 37. **14**: 5, 70, 101. **15**: 9, 23. **17**: 75. **18**: 67. **19**: 112. **20**: 12, 53.
anadenium, **17**: 20.
Concordianum, **15**: †23.
dilatatum, **11**: 17, 83, 101. **12**: 10, 104. **13**: 37. **14**: 101. **15**: 24. **16**: 102. **17**: 75. **20**: 12, 25.
fructuosum, **15**: †23.
intermedium, **11**: 101. **13**: 37. **14**: 5, 101. **15**: 9, 23. **17**: 75. **19**: 112. **20**: 12, 39.
Pittsfordense, **15: 23.**
stipulare, **15**: 24.
thelypteris, **11**: 36, 68, 101. **12**: 37, 47, 69. **13**: 12, 37. **14**: 4, 69, 100. **15**: 24. **17**: 76. **19**: 111. **20**: 11, 39, 53.
Pufferae, **15**: 24.
suaveolens, **18**: 87.
trifoliatum, **12**: 37.
unitum, **11**: 71.
glabrum, **11**: 14, 46. **12**: 37. **14**: 110. **15**: 24.
Nephrolepis
acuta, **11**: 23. **12**: 38, 47.
biserrata, **11**: 54. **15**: 45.
cordifolia, **11**: 54. **15**: 84.
exaltata, **11**: 22, 23, 47. **12**: 38, 47. **15**: 45, 73.
pectinata, **11**: 54.
sesquipedale, **11**: 54.

Notholaena
Aschenborniana, **11:** 36. **17:** 6.
candida, **11:** 36.
cochisense, **20:** 79.
cretacea, **12:** 5. **15:** 45.
dealbata, **11:** 36. **12:** 76. **15:** 45. **17:** 5.
Fendleri, **15:** 45.
ferruginea, **11:** 36. **15:** 45. **17:** 6.
Grayi, **11:** 36. **15:** 45. **17:** 3.
Hookeri, **11:** 36. **15:** 46. **17:** 3.
hypoleuca, **20:** 79.
Newberryi, **12:** 5. **15:** 46.
nivea, **15:** 46.
Parryi, **12:** 5. **15:** 46.
Peruviana, **13:** 82.
Schaffneri, **11:** 36. **15:** 46.
sinuata, **11:** 36. **15:** 46. **17:** 36.
tenera, **12:** 6. **15:** 46.
Odontosora
clavata, **12:** 47.
Oleandra
Wallichii, **14:** *†106.
Onoclea
sensibilis, **11:** 4, 21, 23, 36, 69, 101. **12:** 37, 69, 76. **13:** 13, 24, 38, 58. **14:** 6, 71, 99. **15:** 11, 46, 50. **17:** 76. **19:** 6, 113. **20:** 13, 40, 53.
  obtusilobata, **12:** 76. **15:** 46. **17:** 19, 76. **18:** *106.
struthiopteris, **14:** 6, 99. **15:** 11. **19:** 113. **20:** 13, 40, 53.
Ophioglossum
Californicum, **12:** 4. **13:** 49, 113.
crotalophoroides, **11:** 3, 34. **12:** 34. **13:** 117.
Engelmanni, **19:** 108. **20:** 14.
palmatum, **12:** 34, 47. **13:** 119.
pusillum, **11:** 2, 34. **12:** 34, 47. **13:** 6, 119. **15:** 3. **19:** 72, 107.
vulgatum, **11:** 2, 34, 81, 99, 120. **12:** 4, 34, 65. **13:** 36, 119. **14:** 6, 66, 98. **17:** 68, 102. **20:** 14, 25, 36, 67, 82.
  Alaskanum, **13:** 119.
  arenarium, **13:** †119.
  Engelmanni, **13:** †119.
Osmunda
cinnamomea, **11:** 3, 21, 23, 34, 67, 99. **12:** 26, 35, 50, 65, 103. **13:** 7, 23, 36, 57, 119. **14:** 6, 67, 99. **15:** 4, 39. **17:** 69. **19:** 108. **20:** 14, 22, 36, 53.
  angusta, **17:** *‡11, 89.
  bipinnatifida, **14:** ‡44.
  cornucopiafolia, **16:** *‡107.
  frondosa, **13:** 119. **17:** *10. **18:** 53.
  glandulosa, **11:** 52. **13:** 119. **15:** 85.
  incisa, **13:** 103, 119. **15:** *16. **17:** 19.
  trifolia, **17:** *‡12.
claytoniana, **11:** 67, 100. **12:** 24, 36. **13:** 119. **14:** 6, 67, 99. **15:** 4. **17:** 70. **19:** 108. **20:** 14, 22, 36.
regalis, **11:** 3, 16, 21, 34, 67, 100. **12:** 35, 47, 50, 66. **13:** 7, 24, 36, 58. **13:** 119, 122. **14:** 6, 67, 99. **15:** 4. **17:** 70. **19:** 108. **20:** 14, 23, 36, 53.
  linearis, **17:** *‡9.
  orbiculata, **14:** *‡115.
Pellaea
andromedaefolia, **12:** 8. **15:** 46. **19:** 42.
  rubens, **19:** 44.
aspera, **11:** 34, 36. **12:** 43. **75:** 46.
  compacta, **14:** 113.
atropurpurea, **13:** 33, 36, 68, 101. **12:** 63, 70, 74, 76, 99. **13:** 10, 34, 35, 38. **14:** 3, 68. **15:** 5, 47, 49. **16:** 69. **17:** 4, 7, 14, 15, 76. **18:** 79. **19:** 14, 100. **20:** 1, 10, 37, 52, 58.
  bushii, **18:** 15.
brachyptera, **12:** 8. **15:** 47.
Breweri, **12:** 8. **15:** 47.
Bridgesii, **12:** 9. **15:** 47.
cordata, **13:** 82.
densa, **11:** 80, 82. **12:** 9, 99. **14:** 68. **15:** 47.
flexuosa, **11:** 34, 36. **12:** 9. **15:** 47. **17:** 6.
gracilis, **11:** 68, 101.. **12:** 26, 99, 118. **13:** 34, 38, 84. **14:** 67, **16:** 119. **17:** 76. **19:** 84. **20:** 1, 37.

- intermedia, **11:** 34, 36. **15:** 47. **17:** 3, 7.
- marginata, **15:** 47. **17:** 5, 7.
- occidentalis, **12:** 99. **15:** 47.
- ornithopus, **12:** 8, 113. **15:** 47. **19:** 42, 45.
- pulchella, **11:** 36. **15:** 47. **17:** 6.
- ternifolia, **11:** 34, 36. **14:** 113. **15:** 47. **17:** 3, 7.
- truncata, **20:** 79.
- Wrightiana, **11:** 33, 36. **12:** 8. **15:** 47. **17:** 3, 7.

Phanerophlebia
- auriculata, **17:** 4.

Phegopteris
- alpestris, **11:** 82. **12:** 10, 98. **15:** 48.
- calcarea, **11:** 68.
- dryopteris **11:** 68, 82, 102. **12:** 98, 109. **13:** 38. **14:** 2, 69, 101. **15:** 10, 48. **17:** 76. **19:** 5, 9.
  - Robertiana, **14:** 69. **17:** 76.
- hexagonoptera, **11:** 4, 68, 102. **12:** 37, 69. **13:** 25, 38, 54. **14:** 2, 69, 101. **15:** 10, 48. **17:** 76. **19:** 10, 111. **20:** 9, 39.
- polypodiodes, **11:** 68, 82, 102. **13:** 38 **14:** 2. 69, 101. **15:** 9, 48. **17:** 76. **19:** 5, 10, 111. **20:** 9, 39.
- reptans, **12:** 37. **14:** 110. **15:** 49.
- Robertiana, **15:** 49.
- tetragona, **12:** 37. **15:** 49.

Phlebodium
- aureum, **13:** 82.

Pilularia
- Americana, **16:** 17.

Polypodium
- angustifolium, **11:** 56. **12:** 35, 47, **15:** 120.
  - ensifolium, **15:** †120.
- aureum, **11:** 22, 23, 56. **12:** 35, 47. **15:** 120. **20:** 75.
- Australe, **16:** 43.
- brunneo-viride, **11:** 55.
- Californicum, **12:** 4. **15:** 120.
  - intermedium, **15:** †120.
- chnoodes, **11:** 56.
- costatum, **15:** 120.
- crassifolium, **11:** 56.
- cultratum, **11:** 55.
- curvatum, **11:** 55.
- decumanum, **11:** 56.
- dissimile, **11:** 56.
- falcatum, **11:** 81. **12:** 4, 101, 109. **15:** 120. **17:** 5.
- Fawcettii, **11:** 55.
- gramineum, **11:** 55. **16:** *†99.
- grammitidis, **16:** 43.
- graveolens, **11:** 55.
- hesperium, **11:** 81. **12:** 4, 105. **15:** 120. **17:** 5.
- incanum, **11:** 3, 22, 35, 56. **12:** 35, 47, 69. **13:** 8, 59, 83. **15:** 120. **17:** 14.
- Japonicum, **11:** 13.
- lanceolatum, **11:** 57.
- latum, **15:** 121.
- loriceum, **11:** 56.
- lycopodioides, **11:** 57.
- marginellum, **11:** 55.
- pectinata, **11:** 56.
- pectinatum, **12:** 35, 47. **15:** 121.
- phyllitidis, **11:** 22, 56. **12:** 35, 47. **14:** 110. **15:** 121.
- piloselloides, **11:** 56. **14:** *†59.
- plumula, **11:** 55. **15:** 121.
- polypodioides, **15:** 5, 19. **19:** 109. **20:** 37, 73.
- prolongilobum, **18:** *‡97.
- pustulatum, **11:** 12.
- repens, **11:** 56.
- rigescens, **11:** 55.
- Scouleri, **11:** 81. **12:** 5. **15:** 100, 121.
- serrulatum, **11:** 55. **20:** *65.
- squamatum, **11:** 56.
- suspensum, **11:** 55.
- Swartzii, **12:** 36, 47. **14:** 110. **15:** 121.
- thysanolepis, **11:** 56. **13:** 83. **15:** 12. **17:** 5.
- trichomanoides, **11:** 55.
- trifurtum, **11:** 55.
- vacciniaefolium, **11:** 57.
- vulgare, **11:** 67, 102. **12:** 4, 69, 99. **13:** 8. **14:** 2, 33, 67, 101. **15:** 5, 121. **17:** 77. **18:** *‡47. **19:** 5, 109. **20:** 9, 37, 52.
  - alato-multifidum, **14:** 105. **17:** 77.
  - angustum, **14:** 35. **15:** 122.
  - attenuatum, **14:** 35.
  - auritum, **15:** 86. **17:** 113.
  - bifido-multifidum, **14:** 39.
  - Cambricum, **14:** 36.

Churchiae, **14:** 39.
Columbianum, **14:** 37.
cristatum, **11:** 102. **13:** 75.
deltoideum, **14:** 37.
hastatum, **14:** 37.
marginale, **14:** 35.
multifidum, **14:** 38.
perpusillum, **18:** ‡98.
platylobum, **14:** 36.
ramosum, **14:** 38.
rotundatum, **14:** 36. **17:** 77.
semilacerum, **14:** 38.
sinuatum, **14:** 38.
Polystichum
acrostichoides, **11:** 4, 36, 69, 102. **12:** 37, 48, 70, 75. **13:** 13, 36, 56. **14:** 4, 70, 100. **15:** *‡71, 122. **17:** 77. **19:** 112. **20:** 39, 53, 75.
angulare, **16:** 14.
crispa, **15:** †122.
cristatum, **20:** 81.
f. Gravesii, **20:** *‡50.
incisum, **12:** 75. **15:** *‡101, 122.
lanceolatum, **20:** *‡24.
Lemmoni, **12:** 82.
multifida, **15:** ‡71, †122. **17:** *99.
recurvatum, **12:** 79. **14:** 41. **15:** †122.
aculeatum, **12:** 11. **15:** 123. **16:** 43. **17:** 4. **19:** 5. **20:** 28.
angulare, **12:** 11.
braunii, **15:** 123.
Californicum, **11:** 83. **12:** 11.
lobatum, **11:** 83. **12:** 11.
scopulinum, **11:** 83. **15:** 123.
Braunii, **11:** 102. **13:** 37. **14:** 100, **16:** 103. **17:** 77. **20:** 11.
Lemmoni, **12:** 11, 109. **15:** 123.
lonchitis, **11:** 83. **12:** 10. **14:** 70. **15:** 123. **20:** 11.
mohrioides, **11:** 83.
munitum, **11:** 83. **12:** 10. **15:** 123.
flabellare, **15:** 123.
imbricans, **11:** 83. **15:** 124.
inciso-serratum, **11:** 83. **12:** 109. **15:** 124.
solitarium, **11:** 39.
Plaschnickianum, **13:** *†78.
scopulinum, **12:** 11.
Psilotum
nudum, **11:** 15.
triquetrum, **12:** 38, 47. **16:** 23.
Pteridium
aquilinum, **15:** 41.
Pteris
aquilina, **11:** 4, 21, 67, 102. **12:** 70, 77, 89, 109. **13:** 24, 38, 57. **14:** 3, 67, 101. **15:** 5, 26, 124. **17:** 5, 15, 77. **19:** 5, 55, 109. **20:** 9, 37, 53.
crispa, **15:** 124.
lanuginosa, **11:** 82. **12:** 6, 99, 109.
pseudo-caudata, **11:** 4, 21, 22, 37, 102. **12:** 36, 77. **13:** 9, 38, 57. **15:** *‡43, *44, 124. **17:** 77.
pubescens, **15:** 124.
caudata, **12:** 36, 47. **15:** 124.
cretica, **12:** 36. **13:** 9. **15:** 125.
esculenta, **20:** 27.
longifolia, **11:** 4, 21, 22. **12:** 36, 47. **14:** 110. **15:** 125. **19:** 68. **20:** 83.
serrulata, **11:** 4, 14, 104. **13:** 9, 59. **15:** 87, 125.
Rhipidopteris
peltatum, **17:** *†16.
Salvinia
natans, **16:** 16.
Sagenia
apiifolia, **11:** 54.
cicutaria, **11:** 54.
macrophylla, **11:** 54.
Schizaea
pusilla, **13:** 97, 120. **17:** 112. **19:** 77, 88. **20:** 54.
Scolpendrium
Lindeni, **11:** 86.
vulgare, **11:** 102, 107. **13:** 30, 104, **14:** 69, 82. **15:** 125. **17:** 57. **19:** 70.
Selaginella
acanthonota, **13:** 15.
apus, **11:** 5, 37, 104. **12:** 48, 70. **13:** 15, 40. **14:** 8, 74, 103. **16:** 51. **17:** 78. **19:** 114. **20:** 19, 26, 42.
arenicola, **11:** 37. **12:** 38, 47. **13:** 15. **16:** 51.
Bigelovii, **12:** 13. **14:** 111. **16:** 51.
Bolanderi, **12:** 13.
Caribensis, **13:** 74.
cinerascens, **12:** 13. **16:** 51.

densa, **11:** 85. **12:** 100.
Douglasii, **14:** 116. **16:** 51.
Hanseni, **12:** 13.
lepidophylla, **11:** 37. **15:** 25, **16:** 51.
Ludoviciana, **11:** 5. **12:** 38. **16:** 51.
Oaxacana, **13:** 83.
Parishii, **16:** 52.
pilifera, **11:** 37. **13:** 83.
Pringlei **11:** 37. **16:** 52.
rhodospora, **16:** 52.
rupestris, **11:** 37, 71, 85, 104. **12:** 110. **13:** 15, 40. **14:** 8, 74, 103. **15:** 13. **16:** 52. **17:** 78, **19:** 114. **20:** 19, 25, 42.
  acanthanota, **16:** 53.
  Bolanderi, **16:** 52.
  bourgeaui, **16:** 52.
  densa, **16:** 53.
  Engelmanni, **16:** 52.
  Fendleri, **16:** 53.
  Hanseni, **16:** 52.
  Haydeni, **16:** 52.
  Montaniensis, **16:** 52.
  rupincola, **16:** 53.
  Schmidtii, **16:** 52.
  Sherwoodi, **16:** 52.
  toilipila, **16:** 53.
  Wallacei, **16:** 52.
  Wrightii, **16:** 52.
selaginoides, **20:** 19.
spinosa, **14:** 73, 103. **16:** 53.
Watsoni, **12:** 13. **16:** 53.
  mutica, **16:** 54.

Struthiopteris
Germanica, **11:** 16, 69, 102. **13:** 38. **14:** 71. **15:** 125. **17:** 78, **18:** 109.
  pubescens, **15:** 125. **16:** 3.
Cordi, **20:** 71.

Taenitis
angustifolia, **11:** 58.
lanceolata, **11:** 58. **12:** 36. **15:** 125.
Swartzii, **11:** 58.

Tectaria
trifoliata, **14:** 109.

Trichomanes
Kraussii, **12:** 34, 47. **14:** 56, 110.
Petersii, **13:** 6. **14:** 56. **19:** 67.
radicans, **12:** 35, 66. **14:** 56.
reniforme, **15:** *†14. **16:** 44.
sphenoides, **12:** 34, 47. **14:** 56.

Todea
superba, **16:** 45.

Vittaria
lineata, **11:** 22, 23, 58. **12:** 36, 47. **14:** 110. **15:** 126.
remota, **11:** 58.

Woodsia
alpina, **13:** 38. **20:** 13.
Cathcartiana, **20:** 13.
glabella, **11:** 102. **13:** 38. **14:** 71, 99. **15:** 126.
hyperborea, **11:** 102. **14:** 21. 71. **15:** 126.
ilvensis, **11:** 102. **13:** 38. **14:** 5, 71, 99. **15:** 126. **16:** 102. **17:** 78. **19:** 6. **20:** 13, 40.
Mexicana, **15:** 126.
obtusa, **11:** 37, 70, 102. **12:** 70, 77, 81, 98. **13:** 13, 39. **14:** 5, 99. **15:** 11, 126. **17:** 78. **18:** 16. **20:** 13. 40, 82.
  angusta, **15:** 126.
  glandulosa, **15:** 126.
  nana, **15:** 126.
Oregana, **11:** 83. **12:** 11. 98. **15:** 127. **16:** 106. **20:** 13.
scopulina, **11:** 70, 83. **12:** 11, 98, 109. **15:** 127.
  Cathcartiana, **15:** 127.

Woodwardia
angustifolia, **11:** 4, 23, 37, 102. **12:** 36. **13:** 57. **15:** 127. **17:** 78.
areolata, **12:** 81. **14:** 3. **20:** 10.
radicans, **11:** 82. **12:** 9.
spinulosa, **11:** 38. **15:** 127.
Virginica, **11:** 4, 22, 23, 37, 102. **12:** 36, 48. **13:** 10, 39, 57. **14:** 3, 68. 101. **15:** 5, 127. **17:** 78. **18:** 65, 99. **19:** 11C. **20:** 11, 28.
  thelypteroides, **15:** 127. **20:** 76.

Xiphiopteris
serrulata, **20:** *65.

THE AMERICAN BOTANIST

WITH WHICH THE FERN BULLETIN IS NOW INCORPORATED

Is the largest and best illustrated magazine of popular botany in the world. It is devoted especially to the economic and ecological phases of the subject and considerable space is also given to the cultivation and improvement of our native wildflowers and ferns.

PUBLISHED QUARTERLY; $1.00 A YEAR

SAMPLE COPY FREE

Eighteen volumes of The American Botanist, comprising 2,312 pages, were issued before the Fern Bulletin was consolidated with it. Price of these volumes, 75 cents each or the set for $9.00. The numbers are a perfect mine of information for all students of plants and no botanist should be without a set.

Address

WILLARD N. CLUTE & CO.,
PUBLISHERS
JOLIET, - ILLINOIS

SMITHSONIAN INSTITUTION LIBRARIES
3 9088 01453 4044